

4100
***SIDE SCAN TOPSIDE
PROCESSOR***

USER'S MANUAL

Revision: 1.1 /Sept , 2007



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Model 4100 Sonar Processor

Introduction



FORWARD

This manual is intended to provide the user with an understanding of the operation and care of the EdgeTech Model 4100 side-scan sonar processor. Although this manual covers the latest operational features of the Model 4100, some features may be periodically upgraded. Also certain hardware may be changed per customer requirements. Therefore, portions of this manual such as parts lists, schematics, and test features are subject to change. Such sections should be used for reference only. When changes are made that affect system operation, they will be explicitly noted. Also, some options and features may not be active in your unit at time of delivery. Upgrades will be made available when these features are implemented.

Different sonar-processing software may be installed in the Model 4100 depending on customer requirements. Each sonar package comes with different hardware, setup and operational features. Those features unique to particular sonar packages are included in a separate manual.

A Model 4100 system consists of two hardware components plus an installed software sub-component. The hardware components are the Model 4100 topside processor with its color video monitor and the EdgeTech 272-TD towfish. Information relating to the Model 4100 plus monitor and the installed Analog Control Interface (ACI) board is included in this manual. Information relating to the 272-TD towfish and instructions pertaining to the installed sonar processor are included in their own individual manuals.

Throughout this manual, the EdgeTech Model 4100 will be referred to as the 4100 and, except where noted, it will include the 4100 interfaced to the 272-TD towfish via an installed ACI card.

EdgeTech has made every effort to document this product accurately and completely. However, EdgeTech assumes no liability for errors or for any damages that result from use of this manual or the equipment it accompanies. EdgeTech reserves the right to upgrade features of this equipment and to make changes to this manual without notice at any time.

Since clear and concise documentation is inherent for proper operation and understanding of the equipment, we solicit you to contact us with any questions or comments so that we may enhance this manual.

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- (i) the items are used solely under the operating conditions and in the manner recommended in the instruction manual, specifications, or other literature;
- (ii) the items have not been misused or abused in any manner or repairs attempted thereon;
- (iii) written notice of the failure within the warranty period is forwarded to EdgeTech and the directions received for properly identifying items returned under warranty are followed;

and

- (iv) the return notice authorizes EdgeTech to examine and disassemble returned products to the extent EdgeTech deems necessary to ascertain the cause for failure.

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WARNING

THIS EQUIPMENT CONTAINS STATIC SENSITIVE DEVICES

These devices are extremely sensitive to static electrical charges which may be developed on the body and clothing. Extreme care should be taken when handling these devices both in and out of the circuit board. Normal handling precautions involve the use of anti-static protection materials and grounding straps for personnel.

WARNING

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed properly may cause interference to radio communications. It has not been tested for compliance to the appropriate FCC or EC rules designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user, at his own expense, will be required to take whatever measures may be needed to correct the interference. It is the user's responsibility to verify that his system complies with the applicable emission limits.

HARDWARE VARIATIONS & COMPATIBILITY

The 560A contains both standard PC and proprietary hardware. At times EdgeTech may change these standard components due to their availability or performance improvements. Although manufacturers, their models, and styles may change from unit to unit, replacement components will generally be interchangeable.

EdgeTech will make all effort to see that replacement boards are interchangeable and use the same software drivers. At times though, there may be instances where direct replacements do not exist. When this happens, EdgeTech will provide the necessary drivers with the replacement part.

The chassis style may also vary due to availability and vendor model changes. This could result in different card placement and cable routings. All cable routing and part location drawings in this manual should therefore be used as a guide. In addition to cabling, the front panel controls and indicators may change with different available chassis styles. Although the presence and function of the basic controls and indicators will remain the same, their position and style may vary. Additional controls and indicators may also be added for specials and options.

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1. INTRODUCTION

1.1 SYSTEM DESCRIPTION

The EdgeTech Model 4100 Color-Video Side-Scan Processor is the topside control unit for the EdgeTech Model 272-TD side scan sonar towfish. The 4100 provides the valuable added dimension of color and video enhancements to aid in the interpretation of side scan sonar images. The addition of color results in improved target detection over standard hardcopy printout by allowing the choice of an optimum color pattern to accentuate selected targets and features.

With the 4100, an operator has the ability to store segments and selected targets on removable storage media for later playback and analysis. An optional parallel printer may be connected to provide hard-copy records.

The 4100 subsystem consists of a topside processor and a high resolution color monitor. The processor samples raw analog side-scan data from the 272-TD towfish and processes it for display on the monitor. Side scan data is displayed in several formats including the standard waterfall display. Port and starboard channels of either 100 kHz or “500 kHz” are displayed.

The processor unit is a PC device operating under Microsoft Windows. The appropriate hardware and drivers are installed to operate their respective display and archive devices.

Also installed within the 4100 are the towfish power supply and the digital interface. The digital interface consists of three PC mounted circuit boards. They are the Analog Control Interface (ACI), Netlink, and NetBurner boards. Tow-fish analog data is filtered, amplified and digitized in the ACI. This data is then interfaced to the PC bus via the Netlink and NetBurner boards.

The ACI board, as it applies to the 4100, is included in the main manual section. A complete description of the ACI board is included in the Appendix section as well as the internal power supply. Refer to the 272-TD manual under separate cover for tow-fish specifications and for general side scan operation and handling. Refer to the appropriate software manual depending on the interface software used.

1.2 TECHNICAL SPECIFICATIONS AND FEATURES

1.2.1 Processor Unit

Physicals:

Size 18cm H x 43cm W x 48cm D (7in x 17in x 19in)

Weight.....18 kg (40 lbs.)

Power Requirements:

Input voltage ..80 to 140 VAC or 175 to 265 VAC, auto switching.

Power 60 watts avg.

Environment:

Temperature range:

Operating...0 to 45 degrees C (shade conditions)

Storage.....-30 to +70 degrees C

Relative humidity:

Operating...0 to 95% (non-condensing)

Non-oper ...0 to 100%

Processor:

Processor.....Intel Pentium IV, 2.0 GHz
Hard drives.....40 and 120 Gbytes
Operating system....Windows 2000
A/D 12 bits
Data storage ...DVD-RW

Circuit Board Complement:

Motherboard ..Active backplane
Video driver ...SVGA
ACI Proprietary analog interface

Peripheral Interfaces:

Serial RS-232C, Com1 and Com2.
Parallel Centronics printer
Video.....SVGA
Control 2-button mouse/trackball,
Keyboard

Tow-Fish Interface:

Sonar Data Two-channel analog side scan data, either 100 kHz or “500 kHz”.
Trigger+15 VDC pulse, 125 μ sec or 250 μ sec (PW selects operating frequency)
Power+750 to +800 VDC to towfish.

ACI Interfaces: (Refer to Appendix A for details)

Trigger Synchronizing signal for external equipment.
Parallel Data...High-speed parallel-data output port with either 100 kHz or “500 kHz” sonar data.
Serial RS-232C control from processor

1.2.2 Video Unit – TFT LCD Color Display

Screen size 43 cm (17 inch) diagonal
Interface Analog RGB Video
Resolution.....1280x1040
Power 100 to 240 VAC
50 - 60 Hz
45 watts
Weight.....5.4 kg. (12 lbs)
Temperature...5°C - 35°C, oper.

1.2.3 Video Presentation

Display Waterfall, top to bottom;
Wiggle trace
Color Palettes.Selectable preset and user-generated palettes including gray and inverse gray
Controls.....Direct on-screen button icons, pull-down menus
Image size 1280x1040

1.2.4 Controls and Status Indicators

All towfish controls and display functions are set by selecting onscreen icons and/or menu items with a mouse and keyboard. The position and location of the operating controls and status information is dependent on the installed processing software. Refer the processing software manual for information specific to the installed software.

1.2.5 Towfish Power

An internal +800VDC power unit supplies power to the towfish.

1.2.6 Synchronization

The towfish trigger output provides synchronization with external equipment. The trigger signal is output when the 272-TD is commanded to fire.

1.2.7 Speed Input

Vessel speed may be either manually set or acquired automatically from a GPS or any other navigation unit with the appropriate NMEA-0183 message output. When archiving, the speed value is recorded with the data and is available for post processing during playback. Speed is displayed on the screen.

1.2.8 Navigation Input

The 560A accepts NMEA-0183 style navigation messages over an RS-232 serial port. The default serial setup is:

Port.....Com 1
Baud Rate 4800
Data Bits 8
Start Bits 1
Stop Bits 1
Parity.....None
Handshake.....None

In order to interface with a wide range of commercially-available GPS and other navigation systems, the processor unit accepts the standard NMEA-0183 sentences as outlined in the NMEA-0183 Standard for Interfacing Marine Electronic Devices. Refer to Section 3.

1.2.9 Control Input

The 560A accepts control messages from the sonar processor over an RS-232 serial port. The default serial setup is:

Port.....Com 2
Baud Rate 4800
Data Bits 8
Start Bits 1
Stop Bits 1
Parity.....None
Handshake.....None

1.2.10 Data Archiving

Device DVD-RW
Media DVD
Capacity 4 GByte

1.2.11 Hard Copy Archiving

The parallel output is software configured to either print single-page color or B&W on a Windows-compatible printer, or print continuously on a thermal gray-scale printer.

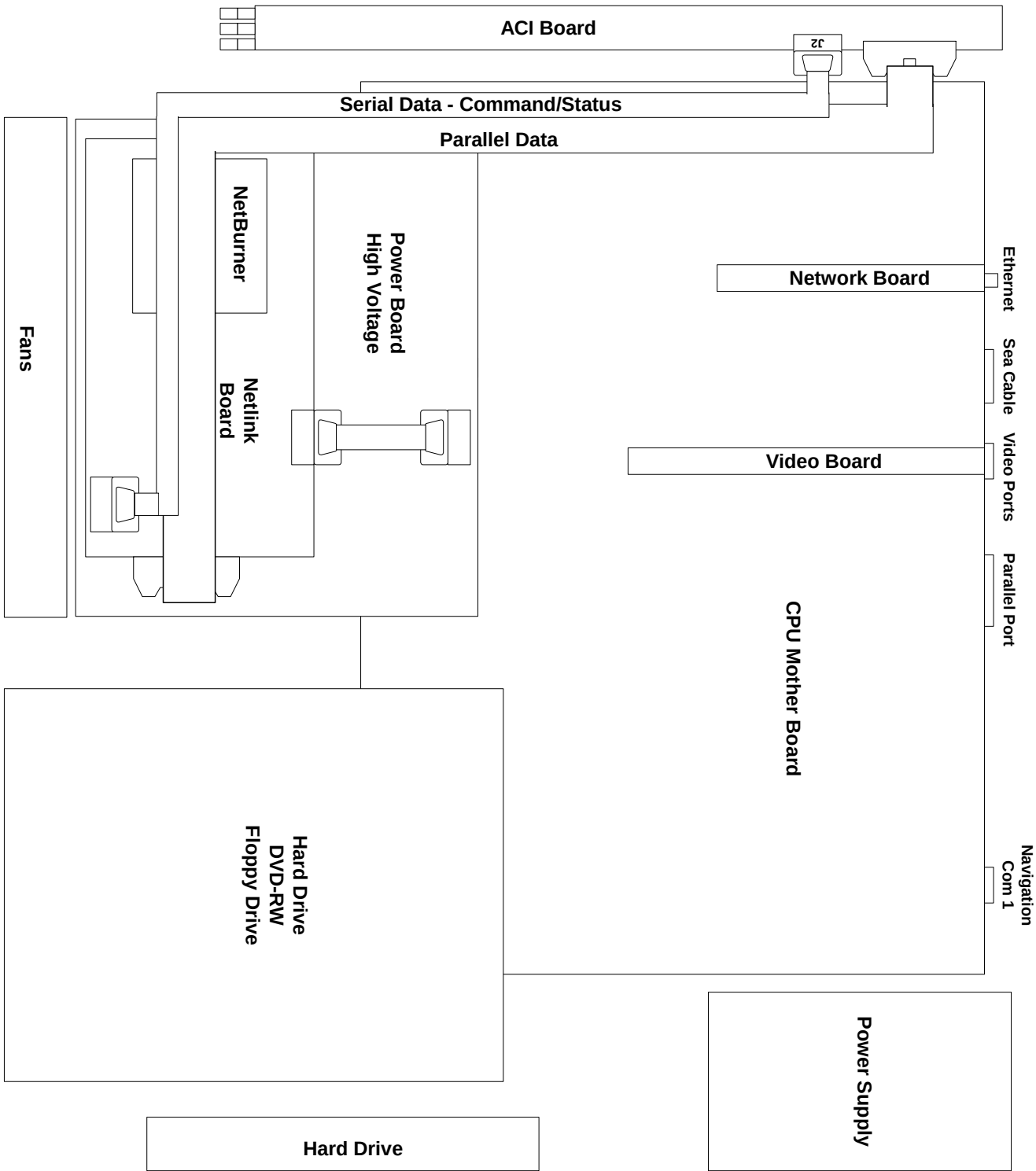


Figure 1-1 4100 Processor Diagram

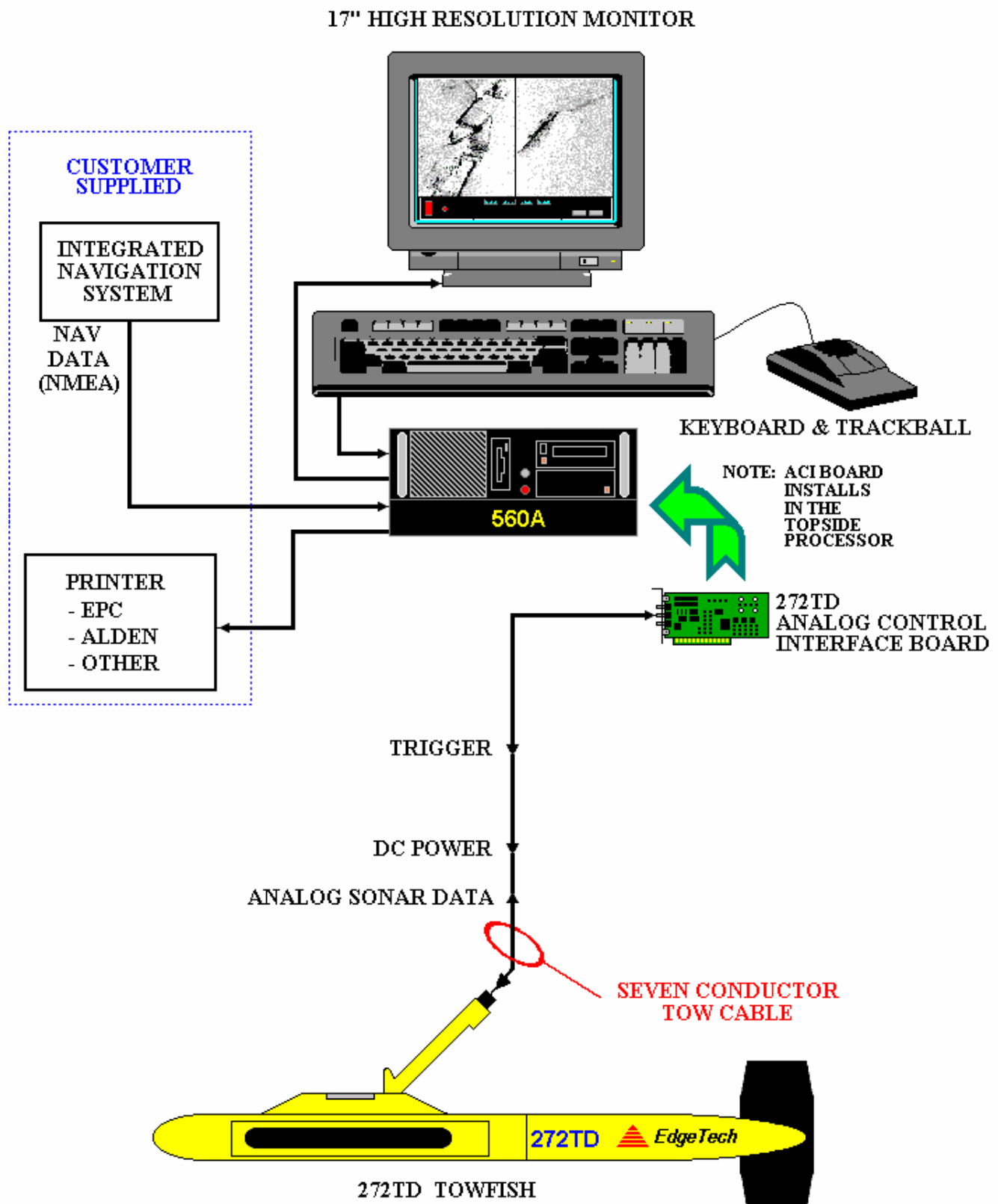


Figure 1-2 4100 System Diagram

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2. INSTALLATION

2.1 GENERAL

The EdgeTech Model 4100 Topside Processor is supplied complete with all the necessary components including cables. Take an accounting of all system components as noted below before each installation and inspect them for damage.

Model 4100 Processor Unit Components

- ___ Model 4100 Processor Unit
- ___ Power Cable
- ___ Mouse/Trackball w/ cables
- ___ Keyboard w/ cable
- ___ 4100 Manual
- ___ Processing Software Manual (hard copy or on disk)
- ___ Windows
- ___ Installation Disks
- ___ System Recovery Disk
- ___ Processing-Software

Video Unit Components

- ___ Monitor
- ___ Power Cable
- ___ Video Cable

2.2 LOCATION SELECTION

The processor unit may be mounted in either a horizontal, vertical or slant position on a flat surface in a dry area. It should not be installed outside in an area exposed to seawater spray.

With the addition of front panel ears and slides, the processor may be mounted in a standard 19-inch rack. Whatever the method of mounting, the surface or rack must be firm and decoupled from vessel vibration.

Readability of color video displays is poor when viewed in direct sunlight. It is therefore not advisable to mount the video unit where direct sunlight will fall on the display face.

2.3 INPUT POWER

The processor operates at both 115 VAC and 230 VAC with automatic switchover. For power requirements, see Specifications Section 1.2. **It does not operate over the full 115 to 230 VAC range.** The video unit on the other hand can operate safely over the full voltage range. Refer to the rear panel for input power requirements.

For proper operation, the power source must be clean; i.e., constant and free from electrical noise. High amplitude, high frequency noise spikes that are superimposed on the input power lines may be coupled into the processor electronics. If large enough, the noise may either degrade the displayed image or cause the processor unit to fail completely. The processor unit is a digital instrument, and a noise spike occurring at a critical computer cycle may cause the system to hang up.

It is best to have the 4100 and associated equipment operate from a dedicated supply, such as a UPS. The processor unit should not be attached to a power source that is also used to drive motors and pumps on the vessel. It is also not advisable to operate the system on batteries with a square wave output, DC to AC inverter, or batteries connected to a switching-type charger.

A standard North American style power plug is supplied at the end of the power cord. If the system is to be used outside North America, cut off the power plug and terminate it with a plug common to the area. Color code for the power cable leads is:

<u>Wire Color</u>	<u>Signal</u>
Black	AC high
White	AC low
Green	Chassis Ground

2.4 SYSTEM INTERCONNECTION

All connections except the mouse/trackball and keyboard are made on the rear panel. Refer to Figure 1-1 and the photograph in Figure 2-1 for the internal system hardware configuration. Views of the front and back panels are shown in Figures 2-2 and 2-3.

**Model 4100 Sonar Processor
Installation**

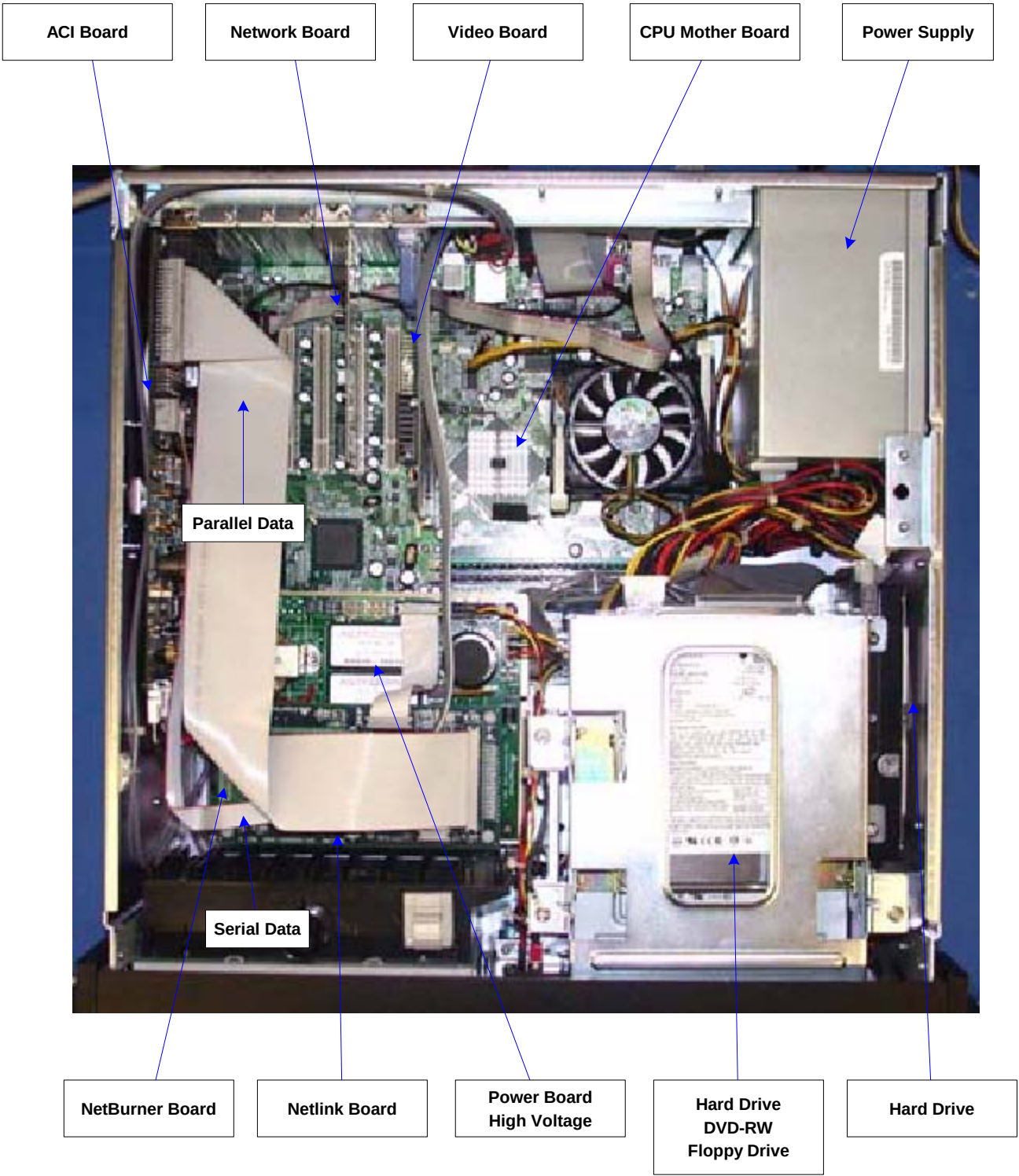


Figure 2-1 4100 System



Figure 2-2 4100 Front-Panel



Figure 2-3 4100 Rear-Panel

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3. OPERATION

3.1 GENERAL

The operating platform is a single board Pentium processor operating under Microsoft Windows.

The Analog Control Interface card (ACI) interfaces the analog side-scan data from the 272-TD towfish to the processing electronics. It filters, amplifies and digitizes both towfish channels. Both buffered analog and digitized data are available for processing. In addition, the ACI board converts serial command messages from the processor to control tow-fish operation. Refer to the Appendix for information pertaining to the ACI board.

The Netlink and NetBurner boards transfer the parallel-formatted data onto the computer bus for real-time video processing and data logging. Other installed cards provide standard interfaces to the normal computer input/output devices such as the monitor and archive devices.

An internal high voltage power unit supplies the towfish operating voltage.

Port and starboard side scan data is formatted in the processor to produce the typical center-out waterfall display plus other display forms and enhancements. Clicking on either function icons or screen menus with the mouse/track ball sets all operating controls except Power.

The purpose of this section is to present general information on the operation of the equipment. It is not intended to be a text on side scan operation and interpretation. Only those features that pertain to the operation of the 4100 processor unit will be covered in this manual. Refer to the towfish manual for information that pertains to side scan operation. Refer to the sonar processor manual for information specific to the sonar display.

3.2 TURN ON

When power is turned on, the processor unit boots from the hard drive. This takes a very short time and is evident by a continuous display of status lines. After the operating system has booted, the operating software automatically starts. The sonar processing software then either automatically or manually starts depending on the setup. At this point, the 4100 is ready for use.

3.3 INITIAL SETUP

Each sonar processor can be configured for use with different hardware and sonar configurations. Although the system is set up for the correct configuration when it leaves the factory and the setup configuration is saved when the system is shut down, the system setup should always be checked prior to turning it on for the first time at each job location. Refer to Appendix C for setup instructions.

3.4 DISPLAY SCREEN

Each sonar processor uses different screen partitions to display the sonar data plus control and status functions. The main screen is the sonar display window where the side scan image is presented. Side scan data defaults to a standard waterfall image where new data scans are added at the top of the image as the oldest scans drop off the bottom. The left image typically contains port data, while the right side shows starboard data. One or two 272-TD sonar channels may be displayed.

Towfish control along with towfish and 560A status information are located on the screen in other sub windows. The location and form of these are dependent on the installed sonar processor. The control group sets up the different towfish operating modes such as the towfish operating range and frequency.

Refer to the sonar processor manual for detailed information on the control and status windows.

3.5 ON-SCREEN FUNCTIONS

Setup and control functions are executed by on-screen point-and-click action through an icon and/or menu system.

Click on a command button once to activate the function with the left mouse button. Some functions are not available at all times and are only enabled under certain conditions. Those enabled functions are boldly displayed while those that are not, are either subdued or blanked out.

Some command functions are toggle action where the operation alternates between off and on each time the function is selected. Other functions control analog parameters. They are set by either 'slider' action or keyboard input.

Refer to the sonar processor's operating manual for specific information on the control and setup functions.

3.6 CONTROLS

There are three switches located on the front panel behind the hinged door to control processor and towfish power plus reset. Listed from top to bottom position, they are:

SIDE SCAN POWER

....A two position locking pushbutton switch that controls power to the 272-TD towfish. The appropriate indicator lights when towfish power is turned on.

SYSTEM POWER

....Momentary pushbutton switch that controls power to the 4100 processor plus towfish. It also controls monitor power if connected to the 4100's switched outlet. Each action toggles power ON and OFF. The appropriate indicator lights when processor power is turned on.

Note: This switch only shuts off the main processor power. It does not turn off the processor's standby power.

RESET....Pushbutton switch that resets the processor.

There is a main POWER switch located on the back panel as part of the computer power supply. It shuts power off to all the circuits. Depressing the rocker switch '1' turns power on. Depressing the '0' turns power off.

3.7 INDICATORS

There are three active LED indicators on the front panel observable from the front and behind the hinged door. Listed in their top to bottom position, they are:

Towfish Power ... Lights when towfish power is turned on. Both system and towfish power must be switched on to enabled towfish power.

Hard Drive.. Lights when the hard drive is being accessed.

System Lights when the processor's system power is turned on.

A red neon TRIGGER lamp is located on the rear panel near the TOWFISH connector. This lamp flashes every time the towfish fires a sonar signal.

3.8 INPUT/OUTPUT CONNECTORS

All connections to external devices are on the rear panel except for the mouse/trackball and keyboard, which are located on the front panel. Connections are labeled and size/shape polarized.

3.8.1 External-Device Connections

All connections are made on the rear panel except where noted.

POWER INPUT

....Provision to attach a 3-conductor power cord with a standard IEC 320-C-13 connector.
Power cord is provided.

POWER OUTPUT

....Switched power outlet for monitor.

PRINTER

....Standard DB-25F connector for a parallel printer.

MOUSE/TRACKBALL (front panel)

....Standard PS2 mouse/track ball connector.

KEYBOARD (front panel)

....Standard keyboard connector.

NAVIGATION

....DB-9M connector for RS-232 input of navigation data. Refer to the sonar-processor manual for accepted navigation data formats.

Connector pin assignments are:

<u>Pin No.</u>	<u>Signal</u>
2	Receive Input
3	Transmit Output
5	Signal Return

COMMAND/STATUS

....DB-9M connector used for diagnostics and troubleshooting. Refer to the ACI appendix for signal format.

Connector pin assignments are:

<u>Pin No.</u>	<u>Signal</u>
2	Status Information
3	Towfish Commands
5	Signal Return

VIDEO ...Standard 15-pin VGA monitor connector located on the video card.

272-T/TD TOWFISH

....Female MS connector to attach the towcable.

3.8.2 Internal-Device Connections

Parallel Data

....Ribbon connection that transfers sonar data between the ACI board and the Netlink Board.

3.9 FUSES

A 1/32 amp tow fish fuse is located on the rear panel near the 272-T/TD TOWFISH connector. This fuse is in series with the towfish high voltage line. It is used to protect the supply in the event of high cable leakage and disable the high voltage on the towfish connector during service and troubleshooting.

Other than the towfish fuse, there are no readily accessible fuses or circuit breakers. There is a hard-wired fuse within the computer power supply and an input voltage fuse on the high voltage power supply board.

3.10 VIDEO DRIVERS AND SAMPLING RESOLUTION

When operating in Windows, the video software drivers must be set to the appropriate display resolution and type. If not, the displayed image will be either unreadable or out of proportion. The factory setting is 1024x768 resolution, 256 colors. If a lower resolution monitor is used, the display will be either blank or out of sync. A high resolution monitor will work with a low resolution setting, but detail will be lost.

Sampling resolution during data acquiring and playback must also match the display resolution. Playing back 1024 samples on a 640x480 display will cause the outside portions of the image to fall off the edges of the screen. The image compresses for the opposite.

Maintain the default factory settings to produce a correct image. This includes the correct video drivers, monitor, and sampling resolution set for 1024.

Video drivers are normally set up in Windows Control Panel. If by chance a low resolution monitor has to be used in an emergency with the processor already set up with the high resolution video driver, the display will be blank. The only way to recover is to set the new video resolution after rebooting in Windows Safe Mode.

3.11 ACQUIRING DATA

When the system is turned on, it will default to the normal side scan display window. The system reverts to the previous operating setup when turned on because the latest configuration is automatically stored when the unit is turned off. Refer to the sonar processor manual for data acquisition, archiving, printing and copying procedures.

3.12 DATA RECORDING & PLAYBACK

There are several methods for recording side scan information with its related housekeeping and positioning data for future playback. Data may be recorded on either of the internal hard drives. Other op-

tional devices are available including a removable hard drive. Refer to the sonar processor manual for recording and playback procedures.

3.13 HARD COPY

Side scan images can be continuously printed during acquisition and playback on a gray-scale thermal paper printer such as the EPC GSP-1086 or Alden 9315CTP. A full screen may be dumped onto a single page Windows-compatible printer.

3.14 NAVIGATION

A serial input port provides for the automatic entry of positioning information from an external GPS navigation source. The source is generally a remote navigation system, but it could be any serial output device with an RS232-C serial link with an NMEA 0183 data format.

Navigation information consists of the time and date plus the vessel's position, speed and heading. To visually check the navigation message format, use Windows Hyper Terminal in the Accessories group. The input message will display on the screen as it enters.

3.14.1 NMEA 0183 Data Format

The 4100 processor will communicate with marine systems that subscribe to the NMEA 0183 interfacing standard.

To obtain necessary time, date, speed, course and position information, the external navigation unit should output a combination of the following standard sentences as outlined in the above referenced specification. Refer to the sonar processor manual for other accepted NMEA messages.

\$-GGA	Latitude/longitude and time
\$-RMC	Latitude/longitude and time
\$-GLL	Latitude/longitude and time
\$-VTG	Speed and heading

Time and heading above are UTC time and true heading. Other sentences of the NMEA 0183 format, if present in the navigation message, are ignored. When enabled, The CPU clock will update its internal clock from the ZDA message and increment the time at its internal rate between messages. Therefore, real time is always available for display and recording.

3.14.2 Annotation

In addition to the above standard sentences, the 4100 will accept the following proprietary NMEA-style message from the external positioning system to annotate the display and/or generate an event mark. A line of up to 21 ASCII characters can be input. This feature is not implemented in all sonar-processors.

\$-EVT,S,AAA--AA,*hh<CR><LF>

Where,

\$-EVT is the sentence identifier,
S.....is an ASCII character flag,
"M" equals print event mark, others to be determined
AAA--AA..is an event annotation/message of up to 21 characters,
hh.....is the checksum,
' and '*' are field delimiters,

<CR> is carriage return,
and

<LF> is line feed.

3.14.3 Serial Specifications

Interface.....RS-232C
Port Com1
Baud Rate 4800
Data Bits.....8 (d7=0)
Start Bits.....1
Stop Bits.....1
Parity None
Update Rate 1 per second max.
Handshaking.....Not required.

4. THEORY OF OPERATION

4.1 HARDWARE

The 4100 sonar processor consists of two major components.

- Processor Unit
- Video Monitor

The processor unit consists of a Pentium processor with video and I/O drivers, plus a set of digital interface cards to digitize the analog towfish signals and transfer the digitized data to the processor's data bus. Standard PC driver cards are used to interface with the video, keyboard and other typical computer components.

All data processing, storage and display are controlled from the main CPU as well as sending commands to control the towfish. Software stored on the hard drive manages all these control and I/O functions. It also formats and sets up the sampled sonar data to generate a typical side scan waterfall image, and applies gain, contrast and color enhancements to these images.

The ACI, Netlink and NetBurner boards are the interface between the processor electronics and the 272-TD Towfish. Analog side scan data is filtered, amplified, and digitized in the ACI card. The digitized parallel data is transferred to the processor's data bus through the Netlink and NetBurner boards.

A bidirectional serial port passes towfish command signals from the main CPU board to the ACI board. The ACI converts these commands to the appropriate action. Refer to the ACI appendix for specific command information.

Power is the only electrical connection that the ACI board has to the processor's data bus.

4.2 SONAR IMAGE

The instantaneous sonar echo level is a measure of the backscattering strength of a target or roughness of the seafloor material. Reflections from each sonar transmission are displayed at different intensity levels with respect to time, outward from the center of the video display. The right-hand portion is normally for the starboard transmission and the left for port. As the towfish moves forward, the displayed image correspondingly advances downward in a scroll-like fashion. Subsequent sonic transmissions generate parallel swaths of data giving a continuous image of a wide area on the sea floor.

This image may be displayed in several formats such as a flat pictorial image or a three dimension wiggle trace. Refer to the sonar processor manual for operating details.

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5. MAINTENANCE AND CALIBRATION

5.1 PERIODIC MAINTENANCE

The 4100 topside processor does not require any extensive periodic maintenance other than:

- 1) Wiping the display surface with a soft clean cloth
- 2) Cleaning the cooling-fan blades and filter.

Refer to the 272-TD manual for periodic maintenance on the towfish.

5.2 ACI CIRCUIT BOARD

The ACI board consists of both analog and digital circuitry. Adjustments are only required in the analog section. No periodic maintenance is required unless there is an uncorrectable unbalance in the towfish signals.

Note: It may difficult to get at all the controls and test points when the ACI card is installed in the processor unit. The ACI card may be removed and power applied to the 4-pin connector J9 configured to accept a standard PC power plug. Refer to the drawings in ACI Appendix A for component location.

Refer to Appendix A for the receiver calibration procedure.

5.3 NETLINK/NETBURNER BOARDS

There are no user controls or adjustments.

5.4 POWER SUPPLIES

5.4.1 CPU Supply

No periodic maintenance is required and no operator calibration procedures are required. There are also no external adjustments on the main CPU power supply. All CPU voltage jumpers are preset at the factory.

5.4.2 Towfish Supply

The towfish supply voltage is fixed. It is a printed circuit board mounted in the 4100 chassis.

Warning!

Take care when measuring or servicing the high voltage supply. Its voltage can be as high as 800 VDC.

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6. TROUBLESHOOTING AND REPAIR

6.1 GENERAL INFORMATION

The 4100 processor unit is fabricated mainly with off-the-shelf computer components that are not repairable in the field. The main CPU board, the plug-in I/O driver boards, plus the Netlink, Net-Burner, and ACI cards are field replaceable. Only the manufacturer can service the monitor.

The circuit boards contain static sensitive devices. These devices are extremely sensitive to static electrical charges that may develop on the body and clothing. Extreme care should be taken when handling either the boards or the individual components. It is advisable to use anti static protection materials and personnel grounding straps during handling.



CAUTION

**DO NOT REMOVE OR REPLACE BOARDS
WHILE POWER IS ON**

6.2 GENERAL TROUBLESHOOTING

The 4100 consists of several analog and digital components working together and the important thing in troubleshooting is to try and locate the source of the problem whether it is a defective component, improper setup, or installation issue.

Use the following guide to assist in isolating a problem. It presents various operational problems and general comments as to where to look and what to look for. Refer to the enclosed Diagnostic chart for assistance in troubleshooting and a quick check to verify system operation.

It is impossible to list all possible problem areas and their combinations. Being primarily a digital device, many components are tied together on a common bus vying for the same circuits. At times when one component goes bad, the whole system goes down.

When this happens, it is very difficult to locate the defective component without a 'trial and error' component replacement procedure. For this reason, it is highly recommended that a spare set of major components be kept on hand, especially those that are unique to or modified by EdgeTech.

If the following checks do not identify or remedy the problem, attempt to isolate the failure to one of the system components. As noted above, substituting components may be the only way to identify faulty devices. Remember to substitute an identical unit. If not, different software drivers may have to be installed or the CMOS BIOS may have to change.

6.3 SYSTEM TROUBLESHOOTING

6.3.1 Setup

Make sure that the 4100 is correctly configured for the 272-T/TD towfish. From outward appearances, the 4100 is similar to the EdgeTech models 560D and 560AD.

6.3.2 Turn On

The 4100 processor may hang up at times during power turn on when operating from a generator or inverter that cannot take the initial power surge. This is especially true when both the processor and monitor are electrically linked to turn on at the same time. During turn on, the line voltage momentarily drops out causing a glitch in the processor's power supply. This glitch may cause the processor to go to that "never-never" land where there is nothing that you can do to recover from either the front panel or keyboard.

When this happens turn off the monitor. Then turn the power off and then back on after a few seconds with the power module's Power switch located on the backside. If there is only a Power pushbutton switch located on the front panel, disconnect the AC power cord, wait for a few seconds, and then reconnect it. Turn the monitor power back on after the processor starts to boot.

Knowing that this hang-up condition exists in your setup, turn the processor and monitor on one at a time in any order when powering up.

Some units will not power up immediately when the main power switch on the backside is turned off and then back on within 10 seconds. When power is turned off, wait at least 10 to 15 seconds before reapplying power.

6.3.3 System Check

The 4100 has a Trigger light on the rear panel next to the towfish connector. This light flashes once for each firing of the towfish. If this lamp flashes at the appropriate rate set by the Range control, the topside trigger circuitry and towfish transmitter are working properly. If the light stays on, there may be water leakage in the towcable or towfish. If the light flashes and remains dim between flashes, one of the transmitter circuits may be down due to a shorted SCR.

6.3.4 Preliminary Checks

When the equipment is not functioning, the first item to check is the input line voltage. If a battery is used with an optional DC/AC inverter, make sure that the battery is operating at its normal load voltage. If the voltage is starting to drop, recharge it immediately or replace it with a fully charged one.

The next thing to check is the seating of all the processor unit circuit boards, especially if the unit has been in transit. Remove the processor unit from the case and visually check that all the cards are fully seated. After checking the cards, check that the cable connectors are properly mated.

If the problem still persists, disengage and then re-engage all PC boards and do the same for all board cable connections, before going on to any electrical testing. Refer to the rear panel connection drawing of Section 3 and cable interconnect schematic in Section 7.

All calibration adjustments are preset at the factory and should not require any modifications in the field unless they are inadvertently altered. The analog section may require recalibration if there is a severe uncorrectable unbalance between the two analog channels or the gains are either too high or too low. Check the towfish analog section and transducers in conjunction with the ACI analog section.

The ACI board contains programming jumpers so that it may be configured to operate with different sonar processors. Check that the jumpers have been properly set per Appendix A.

If the above checks do not identify or remedy the problem, attempt to isolate the failure to one of the system components. Substituting components may be used to identify faulty devices. Remember to substitute an identical unit. If not, different software drivers may have to be installed or the CMOS BIOS may have to change.

The built-in test signal on the ACI receiver is invaluable for troubleshooting the analog section. Because it is injected right at the front end, the system can be tested without the towfish. Refer to its use in the following sections.

The following guide presents various operational problems and general comments as to where to look and what to look for. Refer to the enclosed Diagnostic chart for assistance in troubleshooting and as a quick check to verify system operation.

6.3.5 Power Supplies

Before continuing with any electrical testing, check the power supply voltages and fuses.

6.3.5.1 Computer Supply

The computer power supply provides operating voltages for all the components within the processor unit. These include the processor board, its plug-in cards and peripheral components. Without the proper internal system voltages, the 560A will either not work or fail intermittently. Check the +5V and +12V voltages. There are no external adjustments. The voltage range for the 5 volt supply is from +4.75 to +5.25 VDC. The 12 volt supply should be within 10%.

A hard wired fuse is mounted within the power supply module. All power connections to the peripheral devices are standard and can be interchanged.

Note that the supply is a universal model that will operate over the full 80 to 140 and 175 to 265 VAC ranges. If it is replaced with a non-universal type, the power cord should be tagged with the operating voltage to prevent an operator from connecting it to the wrong line voltage and damaging the supply.

6.3.5.2 Tow-Fish Supply



CAUTION

Use caution when servicing, taking measurements on, and working near the towfish's HV Power Supply. Although it is current limited, injury can occur due to the body's automatic reflex when coming into contact with high voltage. Due to the presence of high voltage on the towfish connector, use similar caution when working near or making measurements on this connector. It is advisable to remove the towfish fuse to eliminate any high voltage on this connector.

This unit provides high voltage power to the dual channel towfish receiver and transmitter. It consists of a circuit board mounted in the 4100 chassis. The voltage is not adjustable.

Two fuses protect this supply. One is located on the circuit board at the low voltage input to protect against the supply shorting. The second fuse is in series with the high voltage output. It is located on the rear panel. This 1/32 ampere fuse protects the supply if there is high cable leakage.

Towfish voltage is fixed at around +750 to +800 VDC depending on load. Take caution when measuring this voltage or servicing the supply. For safety, remove the output fuse when doing any work around the TOWFISH connector during calibration or servicing.

6.3.6 ACI Board

6.3.6.1 Programming-Jumper Locations

Refer to the tables in Appendices A for the default ACI board programming-jumper settings for the installed sonar processor and to the board layout drawing in Appendix A for their locations. Although unlikely, if one has been removed or changed from its default setting, the processor may perform at diminished capability, or not operate at all.

Those jumpers not referenced are not applicable for the installed interface. Also regard the notes relative to default circuit bridges on later boards.

6.3.6.2 Receiver

An onboard test signal is injected at the front end of the ACI board's receiver to simulate a towfish signal. It can be used for both calibrating and troubleshooting the ACI board's analog section. The test signal is a repeating sequence of 8 constant-amplitude bars generated after an initial t_0 bar and water column delay. When the test signal is enabled, this signal can be monitored on the port and starboard BNC connectors.

The amplitude and position are the same for both port and starboard channels. The simplest way to verify that the channels are displayed in their correct position on the screen is to short one receiver input and note the location of the diminished-amplitude signal. Refer to the ACI Appendix for information on enabling the test signal.

6.3.6.3 Timing and Control

The digital portion of the ACI card contains the timing and control functions. When commanded from the processor via the serial port, it controls such functions as the towfish's operating frequency, transmit rate and receiver gains.

Monitor the Trigger output signal at the ACI card's BNC connector. Operating range sets the trigger rate and the operating frequency sets the pulse width. As an example, the period is 150 msec for 100-meter range with a pulse width of either 125 μ sec for 100 kHz operation or 250 μ sec for '500 kHz' operation. If these signals are not present, replace the ACI board. If they are incorrect or do not change, check the command signal from the processor as noted below. If the command signals are okay, change the ACI card.

6.3.6.4 Command and Status

The COMMAND/STATUS serial port on the back panel is useful in verifying that the processor sends the appropriate commands to the ACI card and the ACI responds accordingly. Monitor the command and status messages at this port with a communications program such as HyperTerminal, Mirror or ProCom. Compare them to that in Section 3 of the ACI appendix.

Connector pin assignments are:

<u>Pin No.</u>	<u>Signal</u>
2	Status Information
3	Tow-Fish Commands
5	Signal Return

6.3.7 Other Symptoms

6.3.7.1 System Fails to Boot

To see if it is a hard disk problem, insert a system boot disk and boot from the floppy drive. If the system boots from the floppy, the hard drive may have crashed.

6.3.7.2 Error Messages

Refer to the sonar processor's operating manual for information pertaining to error messages relating to the sonar program, not the operating system.

6.3.7.3 No Display

Check that the installed video driver and resolution setting match the display resolution. A good way to check a monitor is to connect it to another operating personal computer. The monitor is not field-serviceable.

6.3.7.4 No Navigation Data

To check the navigation input, go into Hyper Terminal from Windows Accessories and check the signal coming from the navigation unit. Set up for 4800 baud, 8 N 1, and no handshake on the rear panel's Navigation connector (Com1).

6.3.7.5 No Towfish Control

Assuming that the towfish is operational and triggering, the first thing to check is the ribbon cable connection between the processor's Com2 port, rear panel and the ACI card.

The next things to check are the command messages going from the processor to the ACI. Monitor the command messages on pin 3 of the rear panel's COMMAND/STATUS port with another PC that has a communications program such as HyperTerminal, Mirror or ProCom. Observe the commands coming from the port while changing range and compare them to that in Section 3 of the ACI appendix.

A typical command would look like:

<STX>R100<ETX>

Where <STX> and <ETX> display as a 'smiley face' and 'heart' respectively.

If the commands from the processor are not correct, the problem lies in the processor. If they are correct, check the ACI card's Trigger output signal on the BNC connector. Verify that the signal is present and its rate changes with different operating-range selections. Also check that the pulse width changes between 125 μ sec and 250 μ sec for 100 kHz and '500 kHz' operation respectively. If these are not present, replace the ACI board. If they are okay, the problem lies in the fish or tow-cable.

6.3.7.6 No Sonar Display

If the display does not scroll, the problem may be due to one or more possibilities. The first and easiest thing to check is the sonar's setup configuration for the 4100 and chosen towfish. Refer to Section 3.

Next verify that the 272-TD is operating properly. With the towfish connected and system operating, listen for clicking sounds from the transducers at a rate set by the Range command. If there is no clicking, check the 1/32 ampere fuse located on the rear panel next to the towfish connector.

If the fuse is okay, check for +800 VDC on the towfish connector pin C with pin B as reference. Next check for the appropriate Trigger signal on pin F. It is advisable to remove the fuse before making this last measurement to remove the high voltage on the connector. If the voltage and trigger are okay, the problem is in either the towfish or towcable.

The next thing to check is the ACI card and sonar processor with the onboard ACI test signal. When enabled, a repeating sequence of 8 constant-amplitude bars are generated after an initial t_0 bar and water column delay. If the 4100's display scrolls, but there is no test signal, check for the sequence of test bars at the outputs of the PORT and STBD BNC connectors. If they are present, the problem is in either the Netlink/NetBurner cards or the digital portion of the ACI card. If the test bars are not present, check the ACI card.

If the display doesn't scroll, check for the presence of a trigger signal at the TRIGGER BNC connector. If no trigger signal, check the ACI card. Also verify that the Trigger signal is enabled and has not been commanded to turn off by the processor. Turn the Power off and then back on to set the ACI to the default Trigger-On mode.

The next item to check are the Netlink/NetBurner circuit boards by replacing them (NetBurner first) with known good ones. There are no serviceable parts on these cards, nor are there any convenient diagnostic test points.

6.3.7.7 Unbalanced Sonar Display

An unbalanced sonar display may be due to one or a combination of several factors. A towfish or ACI receiver gain and/or transducer sensitivity may have changed, or the seafloor may have an across-track sloping bottom. For a sloping bottom, there is not much you can do except to wait for the bottom conditions to change.

Before checking for a gain unbalance, verify that all display and sonar gain values controlled from the processor are set to equal values.

To check if the unbalance is due to either the towfish or topside unit, disconnect the towcable. Turn the 4100 power off and then back on to reset the ACI gains. Set both port and starboard display gains (if available) to their same default settings and enable the ACI test signal.

If the port and starboard bands are of unequal amplitude, the most likely reason is the ACI gain settings are not balanced. They may be rebalanced by turning the 4100 power off and then back on to reset the ACI board, and then adjusting either the ACI board's port or starboard Gain controls from the sonar panel until the test bars are of equal amplitude. This may alter the calibrated gain values somewhat. Recalibrate the ACI board receivers when convenient to do so.

If the bands are of equal amplitude, the problem is in either the towfish or towcable. This is true only when the ACI receiver gains have not been altered to correct a previous unbalance. Check towcable continuity and leakage before dismantling the fish.

Switch the port and starboard transducer leads to check whether a towfish transducer or receiver is the problem. If the unbalance is on the same side, the problem is with the receiver. If it switches to the opposite side, the transducers are unbalanced.

To compensate for an unbalance due to any source, use the port or starboard gain commands on the sonar menu. The ACI receiver gains may be tweaked to compensate for the unbalance, but this should be the last resort. If the ACI gains are tweaked, however, recalibrate both the ACI and towfish receiver gains when convenient to do so.

6.3.7.8 Poor-Quality Display

Poor display quality may be the result of external noise influence, defective towfish analog circuitry or incorrect display gain/contrast settings.

6.3.7.9 Archiving Problems

The archiving devices are self contained and not serviceable. They connect either directly to the main processor board or through a separate driver card. Archiving problems may be due to the drive itself, the driver card, if so equipped, or due to problems on the processor motherboard. One needs a separate drive and/or driver card to confirm this. Substituting the same or similar type of drive or card for the suspect component will check the processor port.

Note that if a different drive type is used, the CMOS setup has to change accordingly. Different driver software may also have to be installed if a different card is used.

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7. PARTS LIST

7.1 GENERAL

This section includes only the replaceable components of the 4100. Refer to Appendix C for those additional parts associated with a particular sonar processor.

Orders for replacement parts should be addressed to:

EdgeTech
4 Little Brook Road
West Wareham, MA 02576
Tel: (508) 291-0057
Fax: (508) 291-2491
Email: sales@edgetech.com

It is imperative that the following information be supplied with each order:

- Part Number
- Part Description
- Reference Designation
- Assembly
- Model Number
- Serial Number

When equipment is to be returned to the factory for repair or evaluation, notify EdgeTech in advance for a Return Material Authorization (RMA) number to be used in all shipments and correspondence to efficiently track the equipment.

7.2 PARTS LIST, MODEL 4100

4100 Topside System	A958500-01
4100 Processor Unit.....	D958507-01
Drives:	
DVD-RW	181587
40 GB	171255
120 GB	191140
Floppy	171158
Power Supply, CPU	180157
PWB, HV PS.....	200-0000092-1000
Processor Boards:	
ACI.....	C958434
Netlink.....	200-0000090-1000
NetBurner.....	040-NETBURN-1000
Ethernet	192236
CPU.....	190942
Video.....	171344
Rear Plate Assembly.....	C958534
Connector, Towfish, MS.....	103055
Fuse, 1/32 A	183407
Cable, Power	123242
Keyboard.....	171166
Manuals:	
4100.....	A958452
Monitor	171905
Shipping Containers, Environmental:	
560A Processor	171795
Trackball	171263

Appendix A

ACI Module

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APPENDIX A

ACI INTERFACE

A.1. Introduction

The Analog Control Interface (ACI) circuit board is an interface between a topside sonar processor and an EdgeTech Model 272-TD analog towfish. This board provides the analog to digital conversion plus individual-channel analog-gain control of the towfish signal. Both parallel and high-speed serial data are simultaneously available, however, only one type is generally used depending on the selected processor. A digital I/O or DSP board is required in the processor to accept this information.

All control functions are selected by on-screen menu or icon selection at the topside processor. These controls are conveyed to the ACI board via one of the processor's serial ports.

The ACI board has an ISA form factor. It may be installed in the processor or remotely mounted in an external enclosure. When mounted in the processor, the card obtains power from the PC bus. Other than power, there are no signal connections to the bus.

Onboard programming jumpers provide for various configurations and interface-signal polarities to meet the requirements for most sonar processors on the market.

A high voltage supply is required along with the ACI card to power the towfish.. It too may be mounted internal or external to the processor. An analog test signal is provided for troubleshooting without the towfish.

Although the ACI board has been designed to operate with the EdgeTech Model 272-TD towfish, it will also work with the single-frequency Model 272-T towfish. Only 100 kHz data will be available. The ACI board will not work adequately with a Model 272 towfish however.

Note

The electrical interface to the ACI board's digital data output is the same as that for the DCI card that is used with EdgeTech's DF-1000 digital towfish, except that only 2 data channels are available at one time and the data sampling is 2X. This minimizes processor design changes when designing for both boards.

This document provides information on generic installation of, and interfacing to, the ACI card. Refer to other Sections in this manual for specific instructions pertaining to a particular sonar processor.

A.1.1. Specifications

Card Type.....ISA
Size.....4.5 in H x 9.5 in L
(11.4 cm H x 24 cm L)
Power.....+5 VDC via ISA bus or onboard connector
Serial Control Interface:
 Type RS-232C
 Character Baud Rate ... 4800 standard
 Number of Data Bits ... 8(D7=0)
 Number of Start Bits ... 1
 Number of Stop Bits ... 1
 Parity None
 Handshaking None required
Digital-Data:
 Data-Sample Rate 25 kHz per side scan channel
 Data Resolution..... 12 bits per sample
 HS Parallel Output 2x16-bit channels in sequence
 HS Serial Output One 2x16-bit channel in sequence, port and starboard
 Electrical Interface Standard CMOS 'HC' type
Trigger Output
 Connector..... BNC female
 Polarity..... Positive going
 Pulse Width..... 89 μ sec
 Signal Level 0 to +5 volts (CMOS)
 Impedance..... 1K ohms to +5 volts
 100 ohms to 0 volts
Analog Outputs
 Connector..... 2 x BNC female
 Signals..... Port & starboard
 Polarity..... Detected positive signal
 Signal Level 0 to +5 volts
 Source Impedance..... 100 ohms

A.1.2 Input/Output

Refer to Figure 1. at the end of this appendix for connector-pin wiring information and Figures 5 to 7 for their location. Refer to section A.1.1 for specifications.

A.1.2.1 REAR-PANEL BNC CONNECTORS

TRIG OUT Provides a short positive-going TTL level pulse each time the ACI triggers the towfish transmitter. With the ACI as master, it is used to synchronize other sonar equipment

PORT / STBD.....Two separate outputs of the detected analog signals after filtering and amplification just prior to digitization.

A.1.2.2 ONBOARD HEADER CONNECTORS

Serial Port J2 ... Ten-pin header that provides bi-directional RS-232 serial communication between the ACI board and a sonar processor. Tow fish commands are input and towfish status is output. Off-board ribbon cable configures to a DB-9F connector.

Parallel Data J4 (ISIS).....Forty-pin header that outputs parallel side scan data for external processing. Configured for 1:1 compatibility with an internal Triton Technology ISIS connector.

Parallel Data J5 (SIDE SCAN).....Forty-pin header that outputs parallel side scan data for external processing. Off-board ribbon cable configures to a DB-37F connector configured for 1:1 compatibility with the Triton Technology ISIS off-board connector.

Serial Data J3 (DSP SERIAL).....Ten-pin header that outputs high speed serial data to an external processor. Off-board ribbon cable configures to a DB-9F connector.

A.2. Installation

The ACI board may be either installed within the sonar processor's chassis or external to it. When installed inside the PC chassis, it is mounted in an unused ISA card slot for power and mechanical support. There are no signal connections made to the PC's bus. When it is mounted external to the PC, an external power supply is needed for the towfish.

Two ribbon cable connections are required between the ACI board and the PC. One is a serial connection for commands from the PC. The other is the digital data output to the PC. A digital input board is required in the PC to transfer the digitized side scan data to the PC bus.

There are several system variations. Therefore for specific wiring and programming-jumper settings refer to the appropriate manual addendum supplied with a particular application. The default settings are for interfacing with the EdgeTech Model 560A sonar processor.

A.3. Operation

A.3.1 Serial Command/Status Interface

The ACI PCB receives commands from, and sends status information to the sonar processor through a full-duplex serial port. The serial interface is through a 10-pin ribbon cable within the PC. A DB-9F ribbon cable extension is available for an external connection. Refer to Figure for signal identification and connector-pin assignment.

A.3.1.1 ACI COMMANDS

Serial signals from the topside processor control operation of the ACI card. These operational commands include setting the towfish ping rate and its frequency, setting the individual port and starboard amplifier gains, and enabling test signals.

Once a command has been set it retains the last value until the ACI power has been turned off or re-commanded to another setting. Even though the last input is retained, it is advisable to periodically re-transmit the command signals to insure that the towfish is operating at the desired setting in case a noise input causes an accidental switch to another setting.

The command message format is

<STX>Message<ETX>,

where <STX> is start-of-text (02H) and <ETX> is end-of-text (03H). The Message content denotes the command function. Each function is individually controlled with its own message. The messages can occur in any order at any rate.

When turned on, the ACI is immediately active. The following are the various command messages accepted by the ACI. The default values at turn on are denoted in bold.

<u>Parameter</u>	<u>Command</u>	<u>Operation</u>
Range Rxxx.....	Sets side scan transmit rate where “xxx” denotes the Range setting in meters. Values of “xxx” are 25, 50, 75, 100 , 150, 200, 300, 400, 600 and 1000. Range is limited to 150 meters maximum at 500 kHz.	
Frequency: F1	Enable 100 kHz operation	
	F5	Enable 400 kHz operation
Trigger T1	Turn on towfish trigger	
	T0	Turn off towfish trigger
Test Signal	X1 Turn on towfish test signal	
	X0	Turn off towfish test signal
Gain G0 to G4	Gain number. Simultaneous sets the baseline gain on both port & starboard channels in 6 dB steps. Both channels are set to the same gain. G2 is default setting.	
Gain P+, S+		
	P-, S-	Each command input incrementally increases or decreases gain of the respective port or starboard channel in 1.5 dB steps to a limit of ± 12 dB from the G2 default setting.
Reset Z	Software reset of the ACI processor. Resets the ACI board without having to power down the sonar processor.	

A.3.1.2 TOWFISH STATUS

A serial message from the ACI card provides information of the its operating mode. This message may be used by the sonar processor to con-firm that the towfish is operating at the commanded settings. This message occurs at a 1 Hz rate. The Message content consists of six data fields separated by commas as follows.

Note: Spaces are shown below only for clarity. There are no spaces in the message.

\$ETACI, Range, Frequency, Port Gain, Starboard Gain, Trigger, Test Signal <CR><LF>

A typical status message is

\$ETACI, R100.0, F1, P3.0, S-1.5, T1, X0 <CR><LF> ,

where,

Range.....100 meters
Frequency 100 kHz
Port Gain 3.0 dB
Starboard Gain-1.5 dB
Trigger.....On
Test Signal.....Off

The port and starboard gain values are relative to the default start-up value (G2) used for calibration.

A.3.2 Parallel-Data Output

The parallel output provides two channels of side scan data; either port and starboard 100 kHz, or port and starboard '500 kHz.' For every sonar sample, port and starboard data are output in sequence. Either the byte location from start-of-transmission or the built-in ID bits may be used to identify the particular sample.

Data transfer may be setup for either DMA control from the external host or continuous transfer. An internal FIFO allows for asynchronous data transfer between the ACI and host.

A.3.2.1 PORT SPECIFICATIONS

No. of Channels 2 Port & Starboard,
100 kHz or '500 kHz'
No. of Data Bits 16 per sample per channel
Data Resolution 12 bits
Data Sample Rate ...25 kHz per channel
Data Throughput.....50 kHz
Output FIFO.....512 bytes
Output Drive 10 LS TTL
Input.....CMOS (74HC)
Connector.....2x20-pin header internal
DB-37F external

A.3.2.2 SIGNAL IDENTIFICATION

Not every signal associated with the parallel port is used by all sonar processors. Refer to Figures for input/output pin numbers and for timing information. On-board jumpers select the control-signal polarity. The default settings are shown.

D15-D0.....Data output signals.

D15-D4 Side scan data, MSB-LSB

D3 Not used, always a zero.

D2, D1.....Channel ID

00 Port 100 kHz

01 Stbd 100 kHz

10 Port 500 kHz

11 Stbd 500 kHz

D0 Toggles each sonar ping

IRQ User-selectable positive or negative going output pulse approximately 35 μ sec wide that indicates the start of a new side scan line. **(Default is IRQ+)**

DRQ User selectable positive or negative going output signal that when asserted, indicates that data is available for transfer to the external host. As long as DRQ is asserted, data is available in the FIFO for transfer. **(Default is DRQ+)**

RD..... User selectable positive or negative going data clock output 2.6 μ sec wide used in the continuous data transfer mode. Output data is valid on the trailing edge of RD or at a minimum of 120 nsec after the leading edge. **(Default is RD-)**

DACK... User selectable positive or negative going input signal from the host that clocks out the parallel data in the DMA transfer mode. Data read is initiated on the leading edge and is valid on

the trailing edge. The host can continually apply DACK pulses for continuous data transfer as long as DRQ remains asserted. The DACK pulse width must be 20 nsec minimum. DACK is disabled for the continuous-mode data transfer. **(Default is DACK-)**

A.3.2.3 DATA FORMAT

The 16-bit data word consists of 12-bit of digitized data and four housekeeping bits. Of the later, two bits identify the side scan channel, one bit identifies alternate side scan lines, and one is not used. For each data sample, the output sequences through the two channels with port always the first output.

At the start of each sonar line, Bit D0 toggles between high and low and remains in the same state for the duration of the line. This bit can be used to indicate the start of a line for both real-time or post processing. It may be also be used to group samples within a line.

A.3.2.4 OPERATING MODES

An onboard jumper establishes whether the output data transfer is continuous or controlled by a handshake signal from the host processor.

A.3.2.4.1 DMA Handshake Mode

At the start of a new line, IRQ is asserted. The host processor, using IRQ as an interrupt, initializes for DMA transfer. When data is available, DRQ is asserted notifying the host that data transfer can start. The data byte is output when the host asserts DACK and is stable for read-in by the host at the trailing edge. If that is the only data byte available, DRQ will reset, notifying the host that there is no more data available. If on the other hand data is still available in the FIFO, DRQ will remain asserted signifying to the host that it can continue data transfer until the buffer empties.

A.3.2.4.2 Continuous Mode (default)

Data is continuously loaded and transferred to the output buffer as it is sampled. The FIFO is not utilized. Neither is the DACK handshake signal from the host. IRQ is asserted at the start of a new line and DRQ is asserted when data is available. RD is used by the host to synchronize data readout from each channel. The host must maintain the word transfer rate for the two channels in order to keep up with data sampling.

A.3.3 DSP Serial-Data Output

The high speed serial port is designed to interface to a DSP processor. Data is transferred to the host through a single serial channel. For each sonar sample, a 32-bit data string is output, 16 bits of port followed by 16 bits of starboard, MSB to LSB. Output data rate is set by either the host processor or an onboard clock. Programmable jumpers set the source and rate.

When interfacing to a DSP, operate the DSP in its 'variable' mode because data is transferred in bursts, not continuous. Set the I/O board for continuous mode without host control as presented below. The same applies to third-party boards that use the TMS-320 series such as Sonitech's Spirit 30 family.

A.3.3.1 PORT SPECIFICATIONS

No. of Serial Ports 1
 P&S, 100 kHz or
 P&S, 500 kHz
No. of Data Bits.....16 per sample per channel
Data Resolution.....12 bits

Data Transfer Rate ...Selectable
External 10 MHz maximum.
Internal 2, 4, 8 & 16 MHz
Data Sample Rate 25 kHz per channel
Data Throughput 50 kHz
Output Drive.....10 LS TTL
Input CMOS (74HC)
Connector 2x5-pin header internal,
DB-9F external

A3.3.2 SIGNAL IDENTIFICATION

Refer to Figure for input/output pin numbers and Figure 3. for timing information.

NEW LINE.... Positive going output pulse approximately 120 μ sec wide that indicates the start of a new side scan line.

SYNC OUT Positive or negative going output pulse (user selectable), one XCLK cycle wide that notifies the external processor that the first bit of the 32-bit data block will be available on the next falling edge of XCLK.

SER OUT Sequential output data string of 16 bits of port data followed by 16 bits of starboard data, MSB to LSB, for each data point. Data is clocked out at the rate of XCLK and is stable for readout on the falling edge.

XCLK.....Data transfer clock. A shared input to the ACI when data transfer rate is set by the host processor. An output to the host processor when data transfer is set by the ACI. Onboard jumpers set clock source.

SEND DATA ... Control input signal that notifies the ACI that the external processor is ready to accept the next 2x16 bit data string when in the handshake mode. Enables data transfer when in the continuous data transfer mode.

A3.3.3 DATA FORMAT

Data is transferred through a single serial channel. For each data sample, 16 bits of port data are output followed by 16 bits of starboard data. Each 16-bit data word consists of 12-bit digitized data, two bits that identify the side scan channel, one bit that identifies a side scan line, and one not used. The output order of the 32-bit word is illustrated below.

B1 Always a zero
B2-B13 Port side scan, MSB-LSB
B14-B15 Channel ID
 00 Port 100 kHz
 10 Port 500 kHz
B16 Toggles for each line
B17 Always a zero
B18-B29 Stbd side scan, MSB-LSB
B30-B31 Channel ID
 01 Stbd 100 kHz
 11 Stbd 500 kHz
B32 Toggles each sonar ping

Bits B16 and B32 toggle between high and low states at the start of each sonar line and remain in their state for the duration of the line. These bits can be used to indicate the start of a line for both real-time and post-processing. They may be also used to group samples within a line.

A.3.3.4 OPERATING MODES

Data transfer occurs at the XCLK rate. XCLK can be setup to use either the external host processor clock or an onboard jumper-selectable clock.

An onboard jumper establishes whether the output data transfer is continuous or controlled by a handshake signal from the host processor.

A.3.3.4.1 Handshake Mode

Data is continuously available for transfer from the serial port at a 48 kHz 32-bit data-word rate. The NEW LINE signal notifies the host processor when a new side scan transmission has started. A 32-bit serial buffer provides temporary storage for the previous data sample. When the host processor is ready to accept a data sample, it asserts the SEND DATA signal. Then when a sample is ready for transfer, the ACI asserts the SYNC OUT signal, notifying the host processor that data transfer will start at the next rising XCLK signal and continue until the buffer empties or SEND DATA is de-asserted.

The host processor must transfer the entire sample within the 48 kHz data word rate to prevent data loss. For handshake operation, the onboard jumper is set to the INTERrupt position.

A.3.3.4.2 Continuous Mode w/o Host Control

In the Continuous mode, data is continuously output from the serial port at a 48 kHz data word rate. The NEW LINE signal notifies the host processor when a new side scan transmission has started. A 32-bit serial buffer provides temporary storage for the previous data sample. When a new sample is ready, the ACI asserts the SYNC OUT signal, notifying the host processor that the first data bit is available and sequential transfer will start at the next rising XCLK signal and continue until the buffer empties. See Figure.

For continuous output, set the onboard jumper to the CONTInuous position.

A.3.3.4.3 Continuous Mode w/ Host Control

Operation is the same as the continuous mode w/o host control above except that the host controls the data transfer by asserting the SEND DATA signal. Set the onboard jumper to the CONTInuous position.

A.4 Theory of Operation

A.4.1 General Information

The ACI is the data and control interface between a topside sonar processor and an 272-TD towfish. It amplifies, filters, and digitizes the analog towfish signals for processing. There are no operating controls on the ACI board. All operation comes from the sonar processor through an RS-232 serial connection.

These serial command signals are converted by ACI into control signals that set the towfish operating frequency and transmit rate. Control signals also set analog gain and test modes.

The ACI card is a combination of hardware and software-driven functions. Certain features can be modified by firmware. Onboard programming jumpers tailor individual I/O signals to different sonar processors.

Serial and parallel formats of the towfish data are available to the sonar processor. The ACI also provides a trigger signal for synchronizing external equipment to the sonar transmission

A.4.2 Circuitry

A.4.2.1 ANALOG RECEIVERS

Two identical receiver circuits individually process the port and starboard signals. They provide amplification and filtering that is controlled by the onboard CPU. The analog signals are full-wave detected and multiplexed to a high-speed 12-bit analog to digital converter. Analog receiver gain is controlled by software.

A.4.2.2 CPU

The main function of the CPU is to receive serial signals from the sonar processor and transpose these signals to appropriate actions that control the towfish and ACI board. These include analog gain and filter settings, setting the towfish firing rate and frequency, and enabling test signals. The CPU also provides a status message to the processor.

A.4.2.3 TIMERS

A set of three timer chips set various timing functions controlled by the CPU. They include the towfish trigger rate and pulse width, the data-sampling rate, and the test signal frequency and pattern.

A.4.2.4 DIGITAL OUTPUT

This circuitry formats the digitized sonar data output to the sonar processor. High speed serial and parallel data formats are simultaneously available.

The high speed serial port is configured to drive a processor with a DSP input channel. Serial data is buffered in an output shift register. It can be transferred out at either a fixed rate controlled by the ACI or the sonar processor's clock, or by a series of handshake signals between the two units.

Serial sonar data is also shifted into a parallel register for serial-to-parallel conversion and then transferred in sequence to a buffered FIFO register for storage. The FIFO provides temporary storage when the sonar processor momentarily cannot keep up with the input rate during parallel transfer. This also prevents data loss when the processor is setting up for a new side scan line. The requirement for strict timing between the two units is eliminated with asynchronous data-block transfers from the ACI to the processor in burst mode transfers.

A.5 Jumper Setup and Calibration

The ACI board contains both digital and analog circuitry. The receiver section has several analog gain and offset adjustments. The digital section requires various jumper settings to set interface signal polarities as required by the sonar processor and data transfer modes. All adjustments are preset at the factory and should not require any modifications in the field unless certain components are changed or the adjustments are inadvertently altered. No periodic maintenance is required.

Note: It may difficult to get at all the controls and test points when the ACI card is installed in the processor unit. The ACI card may be removed and power applied to connector J9, configured to accept a standard PC power plug. Refer to the figures for component location.

A.5.1 Receiver Calibration

The ACI board has a built-in test signal that can be used for calibrating the receiver. An oscilloscope and DVM are necessary for calibration. A command source with a serial port is also required to send commands to the ACI board. This may be either the sonar processor itself or a PC with a communications-software package installed. Refer to Section A.3.1 for the command protocol.

Calibration can be performed with the ACI card either mounted in the M560A or on the bench. An extender is required to gain access to the adjustment pots and test points when mounted in the M560A chassis.

Proceed as follows to calibrate each receiver on the bench out of the M560A. The test points and controls noted are for the Port channel. Their respective Starboard values are enclosed in parenthesis. Refer to Figure 4 for component locations and Figure 1 for the command signal connections.

- 1) Connect power source to J9, configured for a standard PC-power connector.
- 2) Connect the command source to J2 or to a DB9 cable adapter.
- 3) Turn Power on. The ACI board will default to standard gain, 100 kHz and test signal disabled. Wait 5 minutes for the board temperature to stabilize before proceeding with the calibration.
- 4) Short pins 1 and 2 of signal-input connector J1 (J6).
- 5) Adjust Offset control R16 (R43) for 0 VDC $\pm 0.001V$ at TP7 (TP8).
- 6) Remove the input short and send the 'X1' command to enable the test signal.
- 7) Adjust trimmer capacitor C25 (C58) for a peak signal at TP5 (TP18).
- 8) Adjust the balance control R25 (R50) so that the adjacent peaks at TP40 (TP39) are of equal amplitude.
- 9) Adjust the Gain control R14 (R37) for a +250 mv peak signal at TP7 (TP8).
- 10) Turn Power off and then after 10 seconds, back on. Repeat Steps 5) to 9) above to eliminate any control interaction.
- 11) Send the 'F5' command to enable the 390 kHz test signal.
- 12) Adjust trimmer capacitor C27 (C56) for a peak signal at TP5 (TP18).
- 13) Turn Power off and remove external connections.

A.5.2 Jumper Settings

Different jumper settings may be required for use with different sonar processors. Refer to Table 1 for settings used by various processors. Please note that these settings are applicable for a particular DIO board specified by the processor developer. The developer may however change the DIO board depending on its availability and cost effectiveness. Contact EdgeTech for the latest information.

A.5.2.1 PARALLEL PROGRAMMING JUMPERS

Jumper plugs are used to modify the operation of the parallel port. See Figure for their location and setting information. Default settings are noted below in bold.

Note: On some boards, the default settings for those other than JP11 & JP13, are pre-wired on the backside of the board by a small track across their respective pads. To change from the default value, first cut the track and then add the appropriate jumper if required.

JP11&13.....Selects either CONTinuous output or hand-shake DMA-transfer mode. **(Default is CONT)**

JP6 Sets the polarity of the IRQ output signal. **(Default is IRQ+, jumper installed)**

JP7 Sets the polarity of the DACK input signal. **(Default is DACK-, jumper not installed)**

JP8 Sets the polarity of the RD output signal. **(Default is RD-, jumper installed)**

JP9 Sets the polarity of the DRQ output signal. **(Default is DRQ+, jumper installed)**

A.5.2.2 SERIAL PROGRAMMING JUMPERS

Several jumpers modify the operation of the serial port. See Figure for their location and setting information. Default settings are noted below in bold.

Note: On some boards, the default settings for those other than JP14, are pre-wired on the back side of the board by a small track bridging across their respective pads. To change from the default value, first cut the track and then add the appropriate jumper if required.

JP1 Ties in the external host clock to the onboard XCLK line. Internal clock has to be disabled if connected. **(Default is JP1 not installed)**

JP2-JP5.....Enables and sets the internal data-transfer clock (XCLK). Remove all jumpers when external clock is used.

JP2.....2 MHz

JP3.....4 MHz (default)

JP4.....8 MHz

JP5.....16 MHz

JP10 Sets the polarity for the Synch Out signals. **(Default is SYNC+, jumper installed)**

JP12 Sets the polarity for the Send Data input signal. **(Default is SEND+, jumper is not installed)**

JP14 Establishes whether the output data transfer is CONTinuous or INTERrupt controlled by the SEND DATA signal from the host processor. **(Default is CONT)**

A.6. Troubleshooting

The ACI card uses surface-mount components and as such, there are only a few serviceable components. Serviceable components are located on sockets for replacement. They are chips that interface to the outside world and are susceptible to damage during handling when hooking up to external equipment.

With a CPU processor, different hardware competes and arbitrates for the same data and address lines. A failure of one may result in a failure of all. This makes it very hard to isolate some digital problems without the proper equipment and a thorough knowledge of the data flow. This equipment is not normally found on a vessel.

A.6.1 Programming Jumper Plugs

Programming jumpers configure the ACI board for different sonar processors. During handling, they may fall out. Refer to Table 1 and the enclosed figures for the default settings when used with different sonar processors.

A.6.2 Towfish Interface

Listen for clicking sounds emanating from each side scan transducer. The clicking rate should change according to the selected Range and the intensity should change for the different frequency selections.

The ACI board drives the towfish directly. Monitor the trigger pulse going to the towfish at the TOWFISH connector. The trigger rate changes according to the Range and the width changes according to the operating frequency.

Check the high voltage going to the towfish. There is a low amperage fuse in series with the high voltage line.

A rub sequential test on each transducer will give a relative indication of the operation of the analog circuitry. Try it at different Gain selections.

The ACI card has a built-in test signal that can be applied to the analog input to simulate the towfish. It generates a series of parallel bands at the operating frequency. There is one at T_0 followed by a blank area representing the water column. It is then followed by a continuous series of bands out to the maximum range. The test signal is enabled from the sonar processor or any other serial device that can send the appropriate command message. See Section A3.1.1.

A.6.3 Advanced

Commands from and status messages to the sonar processor occur over a bidirectional serial link between the processor and the ACI board. These operational functions include setting the towfish's ping rate and transmit frequency, and enabling a test signal. Refer to Section A3.1.1 for a listing of these messages.

The operating configuration is contained in the status-message from the ACI. This message can be used by the sonar processor to confirm that the towfish and ACI are operating at the commanded settings.

The serial link between the sonar processor and the ACI board can be broken and a PC, with communication software, inserted to check both the processor-generated commands and the ACI status message without any involvement of the processor unit.

A.6.3.1 SETUP.

Obtain a PC with a serial port and communication software (HyperTerminal, Mirror, ProCom) to read and transmit serial ASCII characters. The sonar processor PC can even be used. Refer to Figure 1. for connector-pin assignment.

1) Set PC serial port to:

Type RS-232C
Character Baud Rate 4800
Number of Data Bits.....8 (D7=0)
Number of Start Bits.....1
Number of Stop Bits 1
Parity.....None

Update Rate 1 Hz
Handshaking None required

- 2) Remove the 10-wire ribbon cable going from the ACI board to the processor serial port.
- 3) Obtain a 10-pin to DB-9F ribbon interface cable and a standard 9-pin serial cable.

A.6.3.2 COMMANDS FROM SONAR-PROCESSOR

Verify the serial commands coming from the sonar processor to the ACI board as follows.

- 14) Attach the standard serial cable between the sonar processor's serial port and the test PC's serial port.
- 15) Monitor the ASCII characters coming from the sonar processor. These messages have the format noted in Section 0.
“<STX>” is start-of-text (02H) and shows up as a ‘smiley-face’ character, and “<ETX>” is end-of-text (03H) and displays as a ‘heart.’ The Message content denotes the command function as set by the sonar processor.
- 16) Change the commands from the sonar processor control panel and observe that the transmitted messages correspond to that of Section 0. Also note that the command set repeats every second.

A.6.3.3 STATUS MESSAGE FROM ACI CARD

Verify the serial status message from the ACI board as follows.

- 1) Attach the 10-pin ribbon cable between ACI connector J2 and the test PC's serial port.
- 2) Monitor the ASCII character string coming from the ACI board. This message has the format noted in Section 0.

Table 1. PROGRAM-JUMPER SETTINGS

Data Transfer Method	Jumper	Signal	Default		Triton/TEI ISIS Parallel	Hunter Sea Sone Parallel	CODA Tech DA Series				
			Signal	Jumper Settings ⁽²⁾							
Serial	JP1	EXTERNAL CLOCK	Internal	no	na	na					
	JP2	INT CLOCK 16 MHz		no	na	na					
	JP3	8 MHz		no	na	na					
	JP4	4 MHz	4 MHz	yes	na	na					
	JP5	2 MHz		no	na	na					
	JP6	IRQ +/-	IRQ+	yes ⁽¹⁾	na	na					
	JP10	SYNC OUT +/-	SYNC+	yes ⁽¹⁾	na	na					
	JP12	SEND DATA +/-	SEND+	no	na	na					
	JP14	INTERrupt / CONTInuous	INTER	INTER	na	na					
Parallel	JP6	IRQ +/-	IRQ+	yes ⁽¹⁾	IRQ+	IRQ+					
	JP7	DACK +/-	DACK+	no	DACK+	DACK+					
	JP8	RD +/-	RD-	yes ⁽¹⁾	RD-	RD-					
	JP9	DRQ +/-	DRQ+	yes ⁽¹⁾	DRQ+	DRQ+					
	JP11	CONTInuous / DMA	CONT	CONT	CONT	CONT					
	JP13	CONTInuous / DMA	CONT	CONT	CONT	CONT					

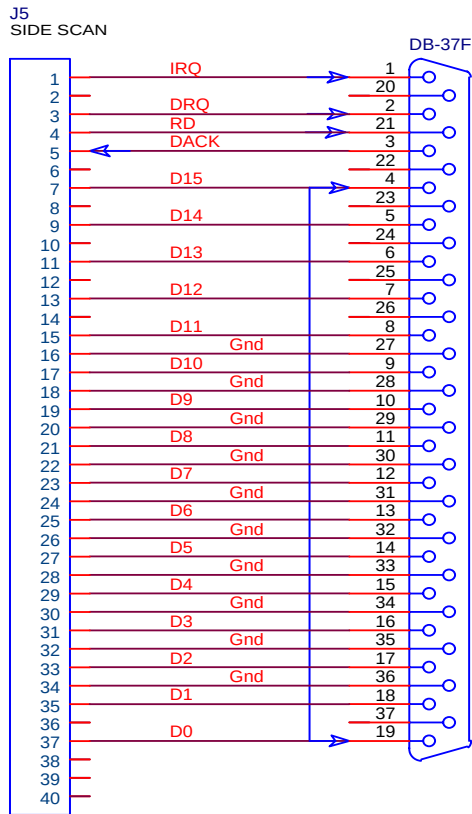
Notes: na = not applicable

yes = jumper installed

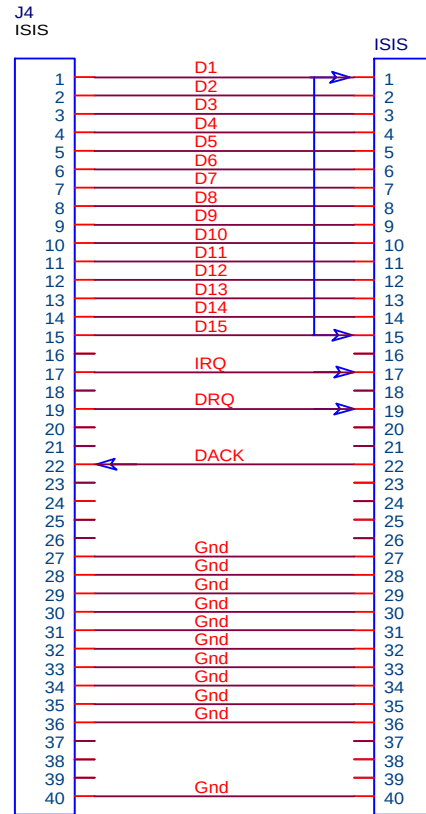
no = jumper not installed

(1) Later boards have a track on the backside of the board bridging the pins in place of the jumper plug.

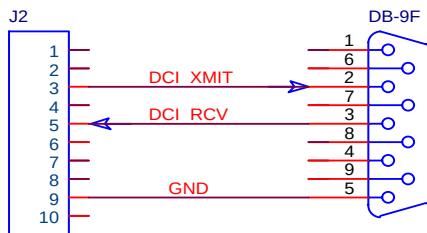
(2) Jumper settings are a function of the selected DIO interface board. Contact EdgeTech for information on these boards.



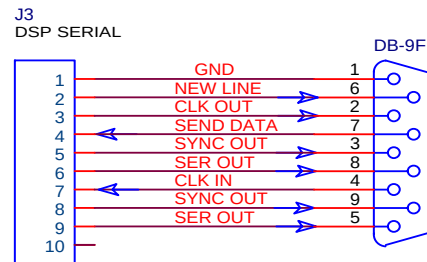
PARALLEL SIDE SCAN



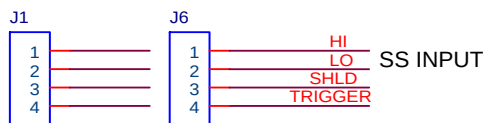
PARALLEL SIDE SCAN



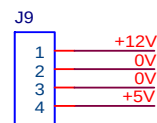
RS-232 SERIAL



HIGH-SPEED SERIAL



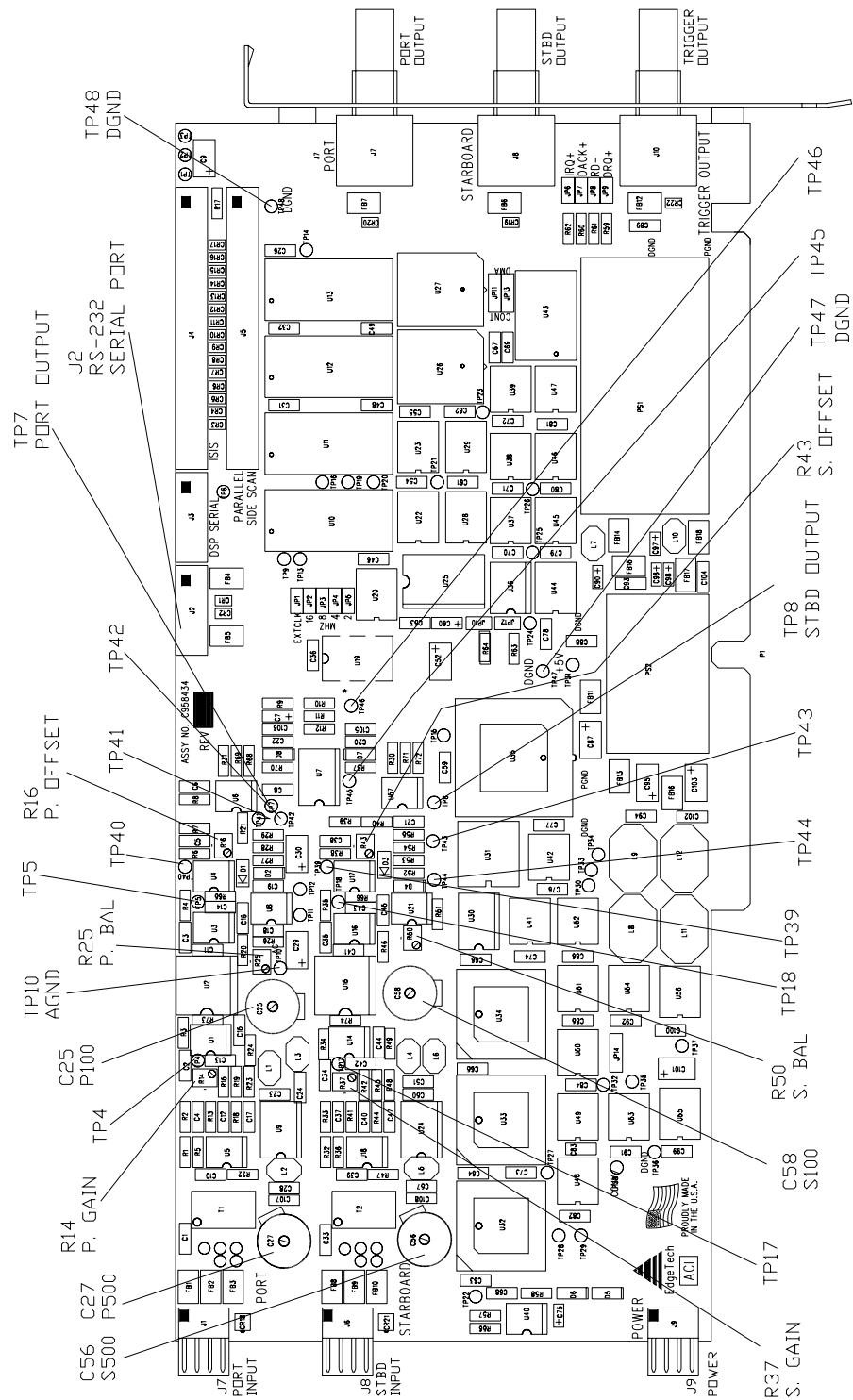
PORT STBD



POWER

Figure 1. Board Input-Output Connectors





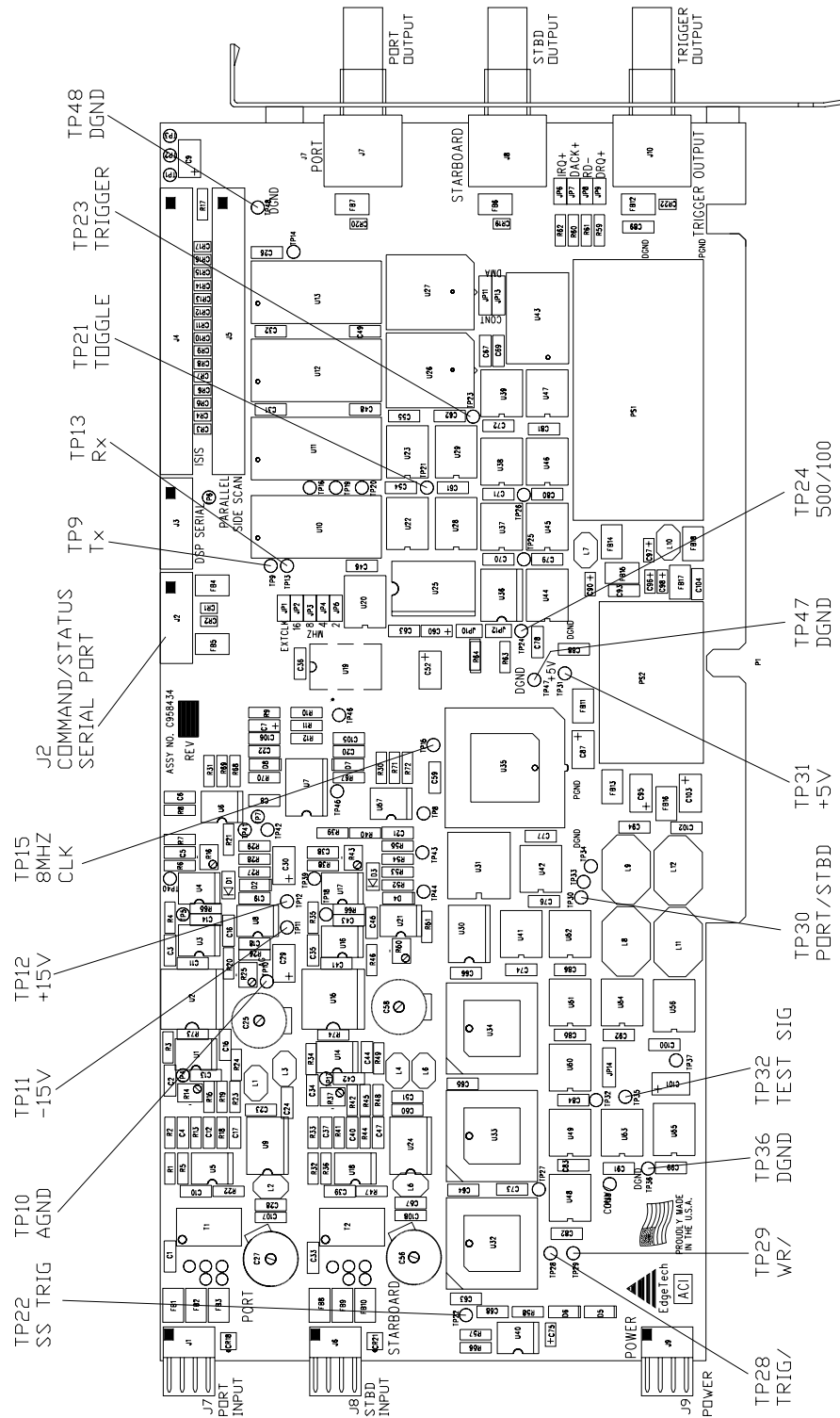
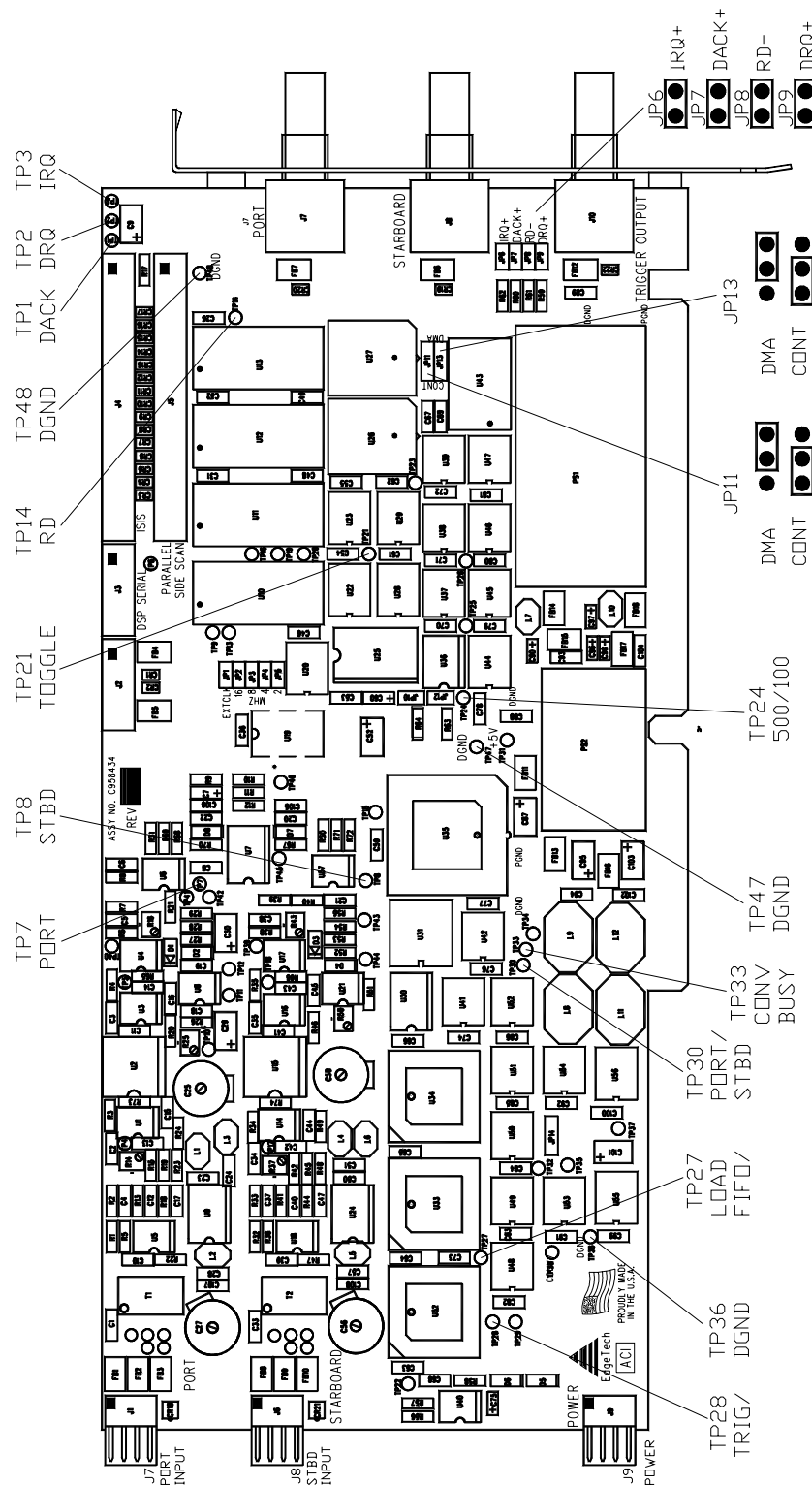


Figure 5. Timing and control



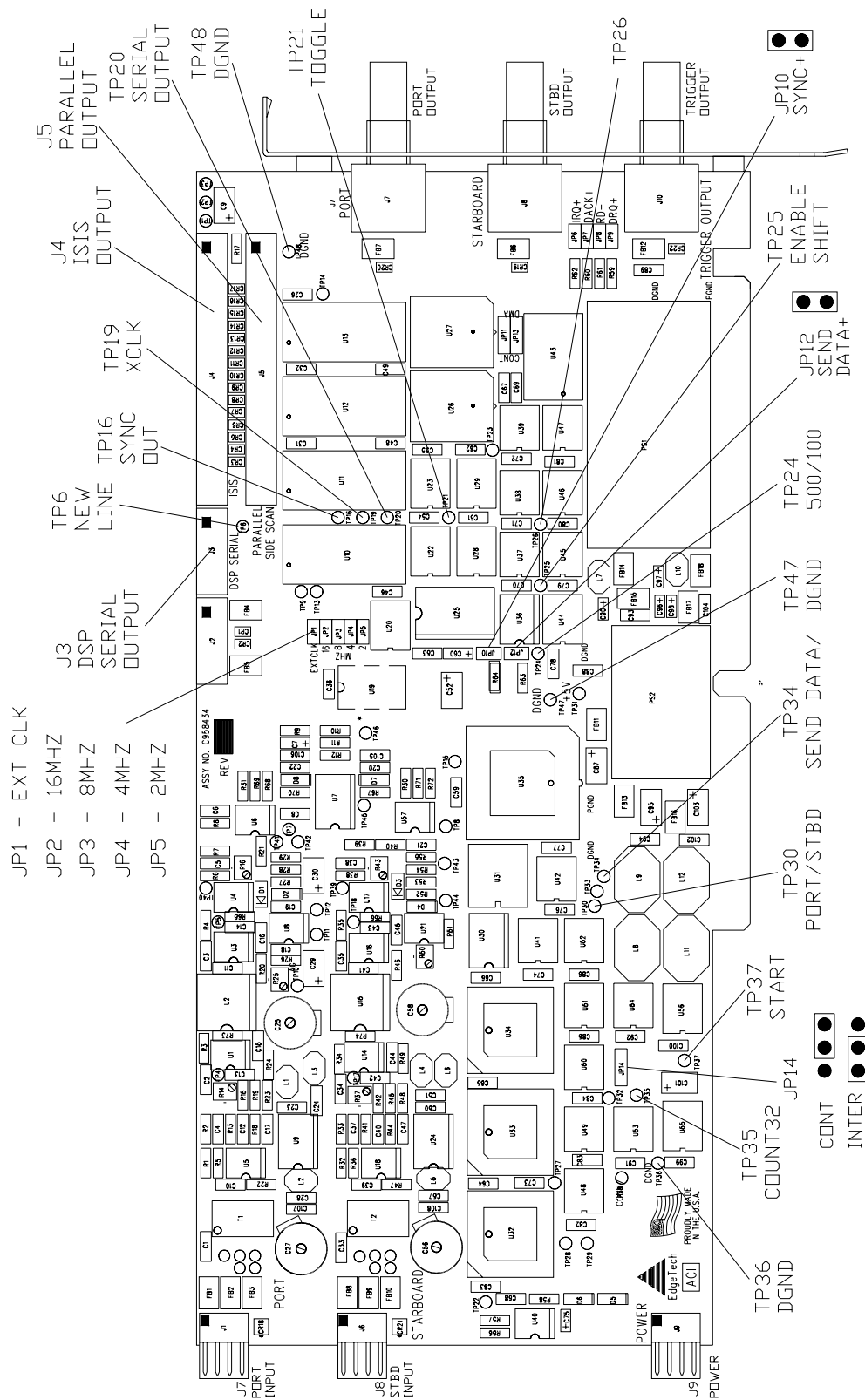


Figure 7. High-speed serial output

Appendix B

Netlink Module

Netlink Module

1. Overview

The Netlink module implements an Ethernet link between the Topside processor and the ACI card. All communications between the Topside processor and the Fish are routed through this Ethernet link.

The ACI card receives and samples the sonar return from the Fish and transfer the digital samples to the Netlink module. The Netlink module packets and transfers the digital sonar samples to the Topside processor via an Ethernet link.

The Netlink module receives Fish commands from the Topside processor via an Ethernet link. The Netlink module formats and sends these commands to ACI card. The ACI controls the Fish as per command.

See Figure 1: Netlink Interface Data Flows.

2. Data Flows

Uplink

Parallel interface: sonar data samples
Serial interface: status strings

Downlink

Serial interface: commands

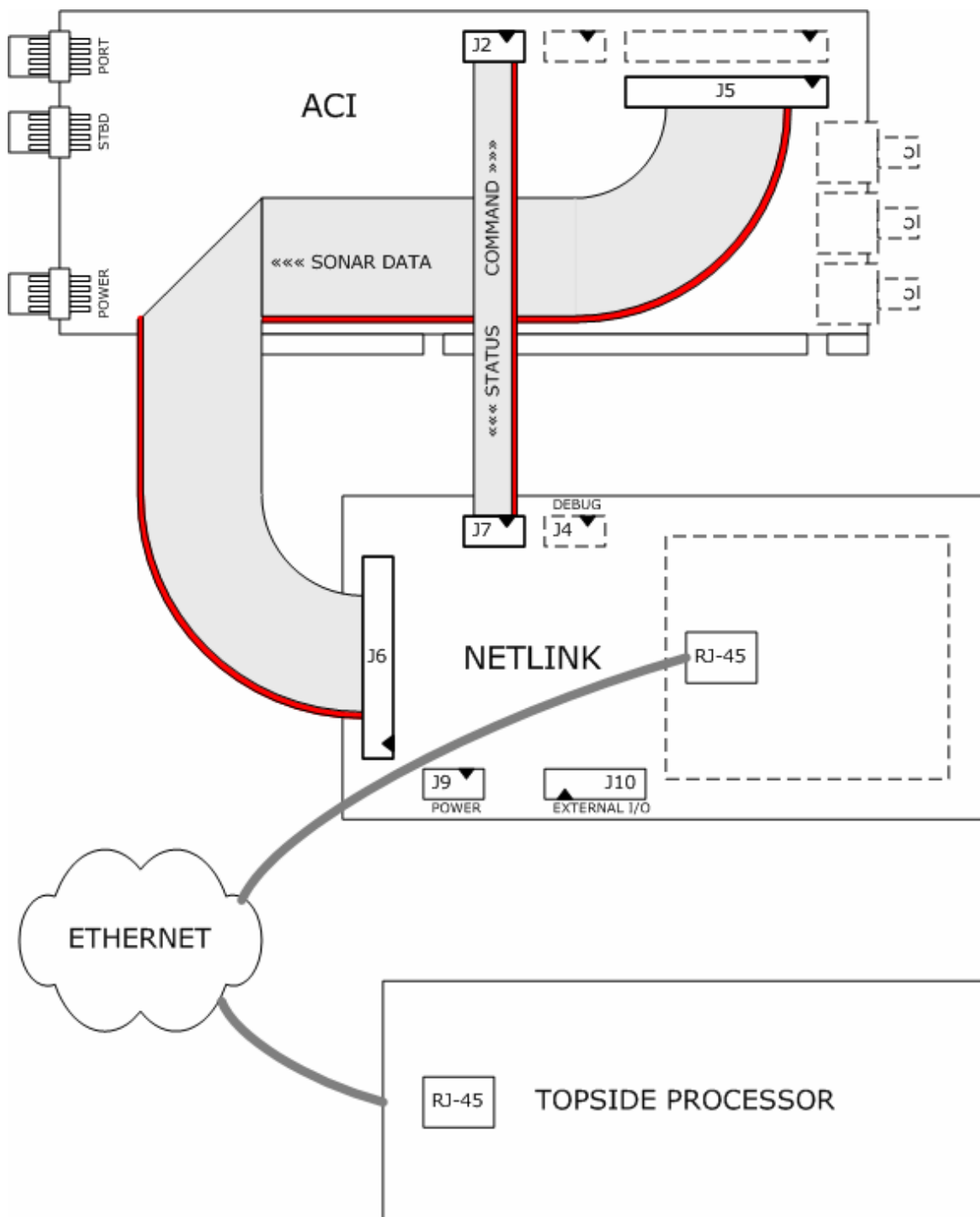


Figure 1: Netlink Interface Data Flows

2.1 Parallel Sonar Data Interface

All signals on the Parallel Sonar Data Interface are ACI outputs, at TTL levels.

ACI Data Rate

Measured rate = 25ksps * 2 channels = 50ksps = 100kByte/s for 16bit samples

ACI Data Format

DATA0 = TOGGLE change level with every new ping
DATA1 = CHAN 0 Port/Stbd indicator, 0 = Port, 1 = Stbd
DATA2 = CHAN 1 Frequency indicator, 0 = LF, 1 = HF
DATA3 = ZERO Always 0 (TTL low level)
DATA[15:4] = Sonar data sample bit [11:0]

ACI Control

RD = Data Acknowledge

Pulse to clock data samples. (Measured pulse length = 3.5us).

The data sample is specified as valid from 120ns after the leading edge of the RD pulse until 5ns after the trailing edge of the RD pulse.

RD polarity is a negative pulse.

IRQ = New Line Start

Pulse to indicate start of new sidescan line. (Specified pulse length = 35us).

IRQ polarity is a positive pulse.

ACI continuous mode operation

ACI continuously streams data samples directly onto its output.

ACI asserts an IRQ pulse at the start of a new side scan ping.

ACI asserts a RD pulse with data valid on its trailing edge.

2.2 Serial Command / Status Interface

Command downlink, Status uplink

RS-232 = 4800-8-N-1 (no flow control)

4800 bps, 8 data bits, 1 start bit, 1 stop bit, NO parity, NO flow control

2.3 EXTERNAL I/O

External I/O for switching Fish Power and driving Front Panel LEDs.

Portable Systems

In Portable Systems, the Netlink module is solely responsible for turning the Fish Power on/off. After power-up/reset, the Netlink software expects status strings arriving from the ACI command/status port. When a valid status string arrives Netlink considers the connection good and turns ON the Fish power. If no valid status string arrives during a 10 second interval Netlink considers the ACI command/status port broken and turns OFF the Fish power.

4100Topsides

In 560A Topsides, the Netlink Module responds to User input via the Front Panel switch to turn the Fish Power on/off. When the 560A Topside is powered off, the Fish power switch always defaults to the Fish power OFF position. When the 560A Topside is powered on, the Fish power switch is always in the default OFF position.

3. Physical Interfaces

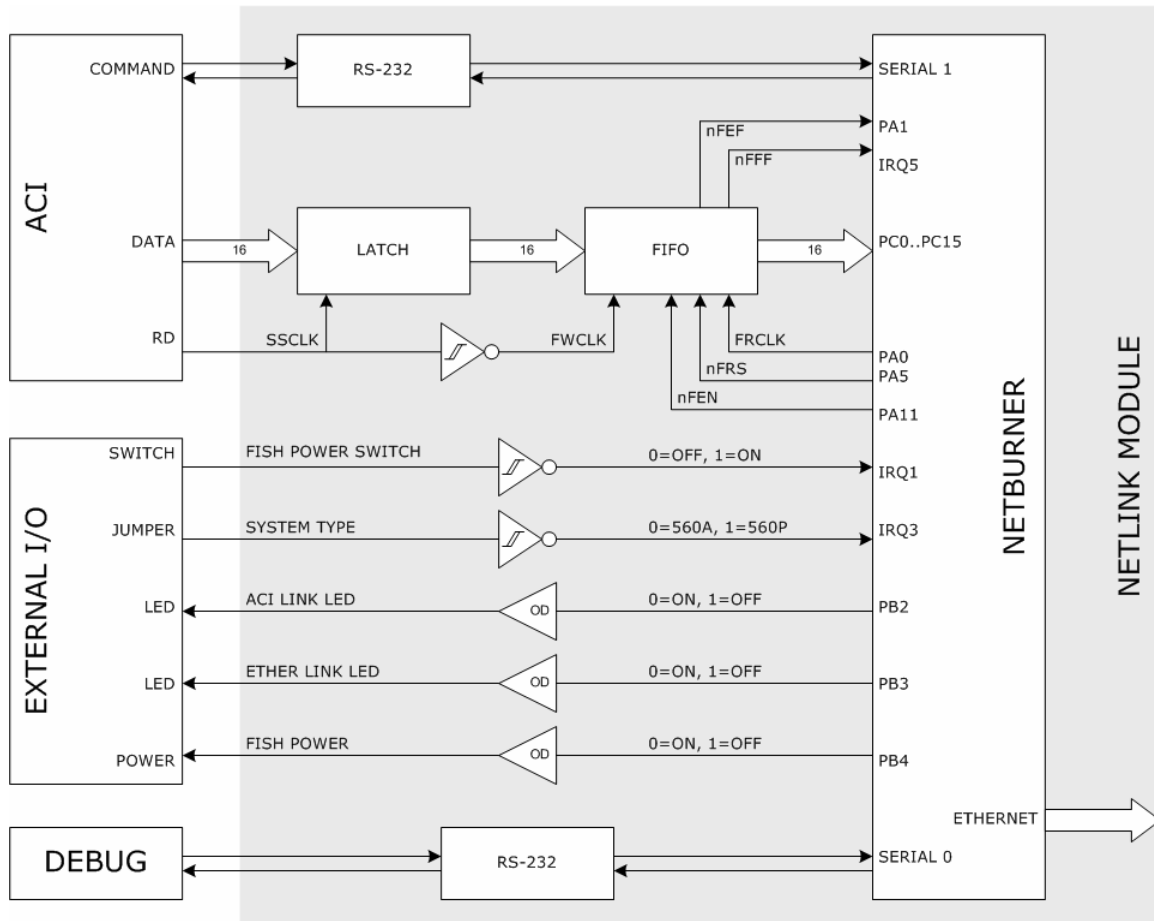


Figure 2: Netlink Interface Block Diagram

3.1 Netlink Power

Netlink-J9 : Power

Standard 4-pin Floppy Drive power connector.

Netlink Module Power Supply requirements: 5V @ 1A

NETLINK POWER	NETLINK J9	
LABEL	PIN	LABEL
+12V	1	
GND	2 3	GND
+5V	4	+5V

Netburner-J1 / J2 : Power

Netburner Power Supply requirements: 3V3 @ 1A

NETBURNER POWER	NETBURN J1 / J2		
LABEL	J1 PIN	J2 PIN	LABEL
GND	1 2 49 50	1 14 46 49	GND
3V3	3 48	2 50	VCC3V

Appendix C

EdgeTech System Backup and Restore

EdgeTech System Backup / Restore

Overview

EdgeTech ships newer Windows XP based Computers with the Norton Ghost CD included, and the Norton Ghost software preinstalled. Older systems shipped with the PowerQuest Drive Image CD included, and the PowerQuest Drive Image software preinstalled. At the time of writing this document, EdgeTech preinstalled and shipped Symantec's Norton Ghost 9.0.

The Drive Backup wizard of the Norton Ghost (or PowerQuest Drive Image) software is used to create a backup image of the hard drive of an EdgeTech Windows XP based Computer onto DVD storage media.

The System Restore Wizard of the Symantec Recovery Disk (or PowerQuest Recovery Environment) is used to restore the backup image from the DVD storage media onto an existing or replacement hard drive (Target Drive) of an EdgeTech Windows XP based Computer.

The Norton Ghost and PowerQuest Drive Image backup procedures are almost identical, and only the Norton Ghost backup instructions are shown in this document. The differences between the restore procedures for the Symantec Recovery Disk and PowerQuest Recovery Environment are shown.

Norton Ghost backup uses Norton Ghost software and the Symantec Recovery Disk recovery environment. The Symantec Recovery Disk is run from the bootable Norton Ghost CD.

Drive Image uses PowerQuest Drive Image software and PowerQuest Drive Image Recovery Environment. The PowerQuest Drive Image Recovery Environment (PQRE) is run from the bootable Drive Image CD.

The Symantec and PowerQuest recovery environments require a minimum of 256 MB of RAM to run, and the drive letters under the recovery environments may differ from those of Windows XP.

Warning: There are two incompatible DVD recording formats: DVD-R and DVD+R. Some DVD writers only support one of these formats. Make sure the DVD writer supports the blank media used for the backup.

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1. Backup Procedure

1.1. Preparing to Backup

Exit all running software applications.

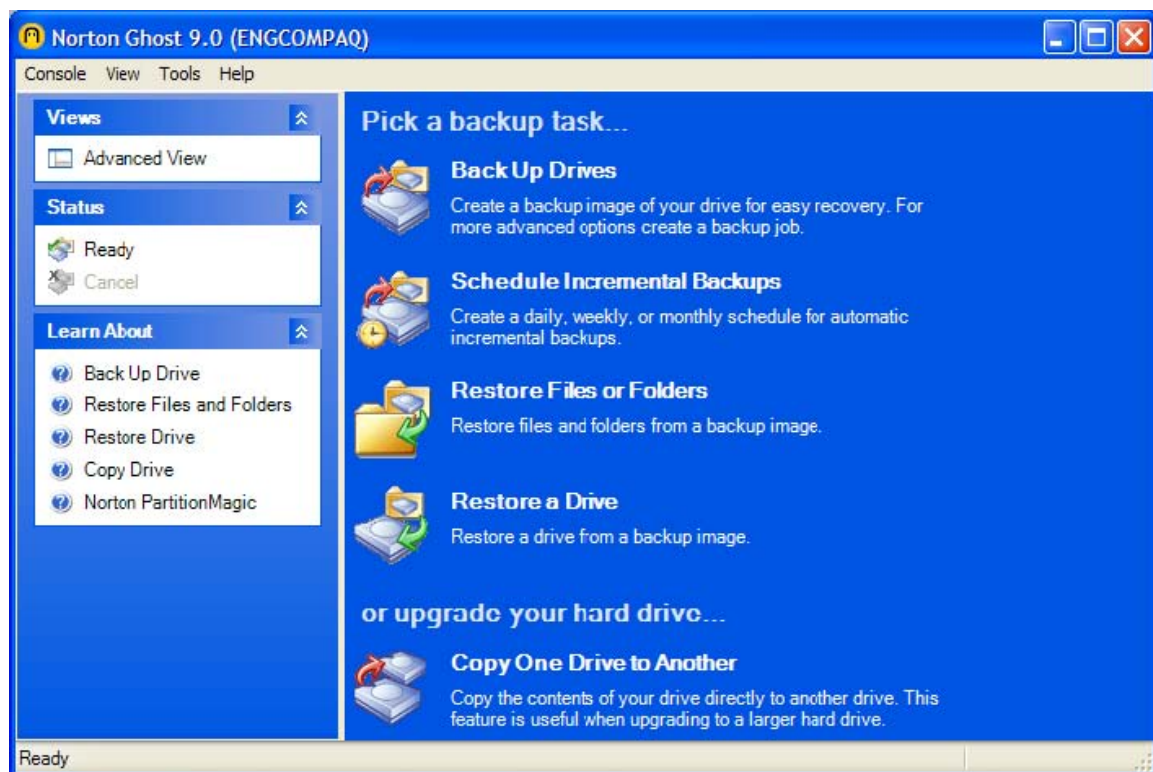
1.2. Starting the Drive Backup Wizard.

From the Start Menu, click Start > Programs > Norton Ghost > Norton Ghost.

Views: Select “Basic View” (this is the default, and this procedure describes only the “Basic View”).

Note: Norton Ghost can also be started by double-clicking its Tray Icon.

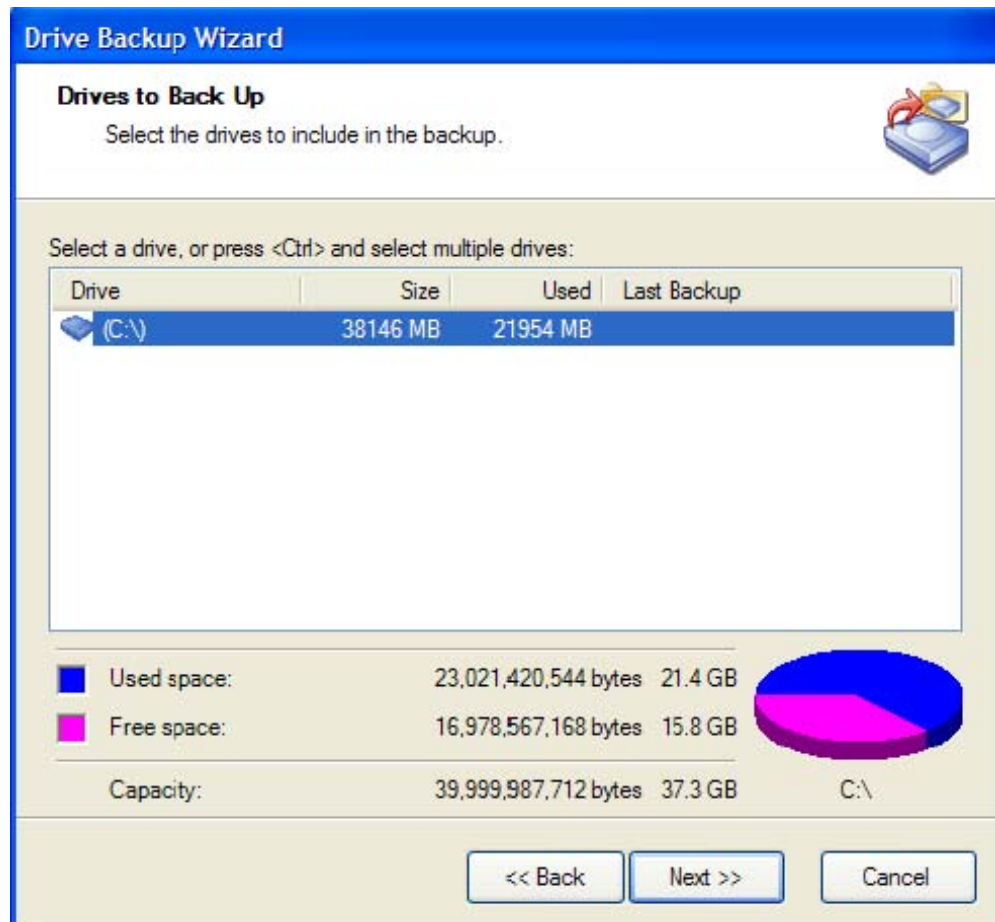
Note: After starting, Norton Ghost may take a while before opening its window.



Click the “Back Up Drives” backup option.

In the Drive Backup Wizard welcome screen that follows, click **Next**.

1.3. Selecting the Drive to Backup



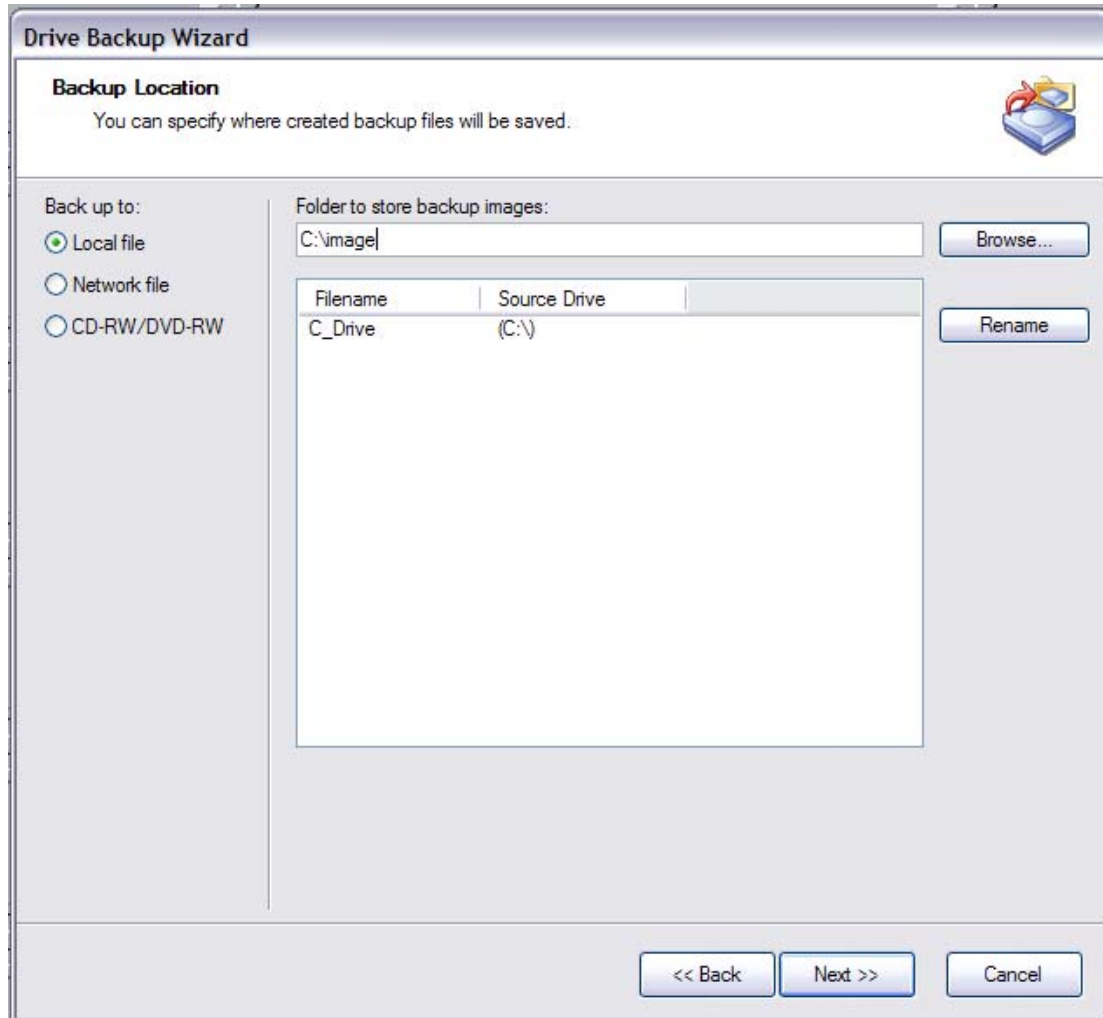
Select the "(C:\)" Drive to back up.

Click **Next**

Note: Actual drive names and sizes might differ from those shown above.

Note: The (C:\) drive "Used" size parameter is a useful estimate of the storage media size required to contain the backup image. The actual "Used" size might differ from the one shown above.

1.4. Selecting the Backup Location



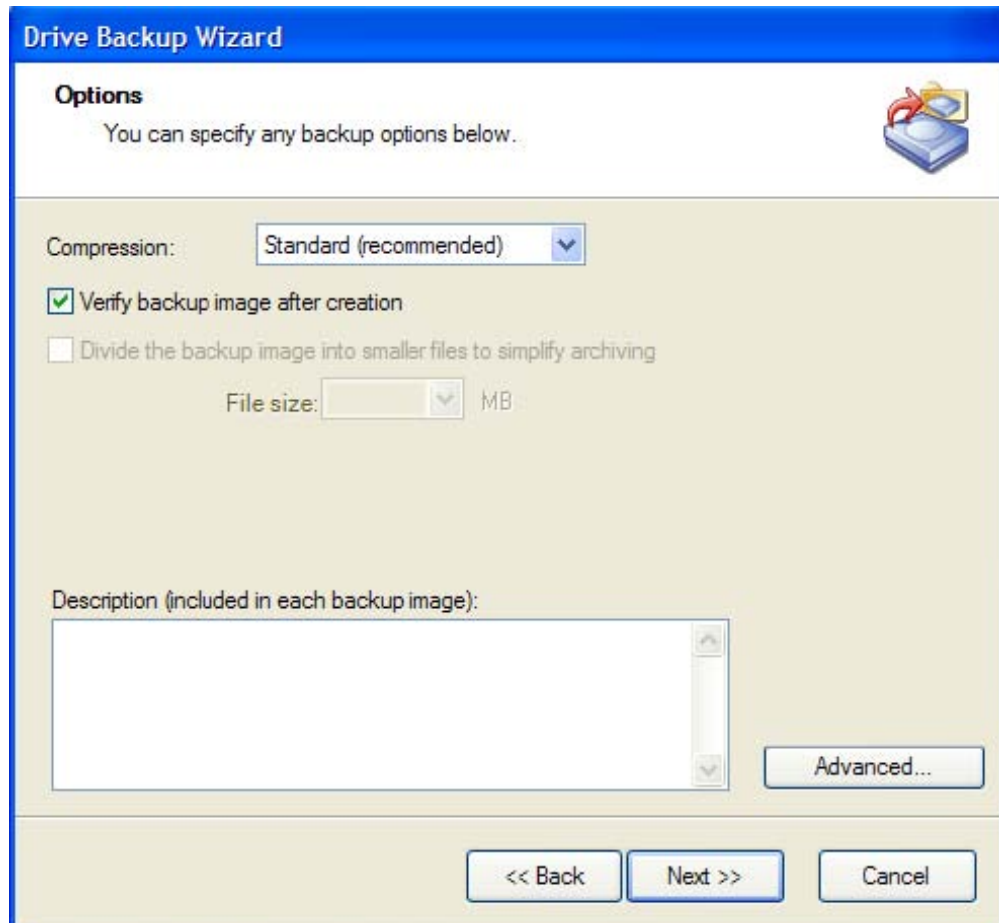
Create folder: C:\image

In the Backup Location Window, select "Local file" as backup location.

Keep the default Source Drive: "(C:\)" and Filename: "C_Drive".

Click **Next**.

1.5. Selecting the Backup Options



The screenshot shows the 'Drive Backup Wizard' window, specifically the 'Options' tab. The window has a blue title bar and a light beige background. At the top, the title 'Drive Backup Wizard' is in white. Below it, the 'Options' section is highlighted. The text 'You can specify any backup options below.' is displayed. To the right of this text is a small icon of a floppy disk with a red arrow. The main area contains several options: 'Compression:' with a dropdown menu set to 'Standard (recommended)'; a checked checkbox for 'Verify backup image after creation'; an unchecked checkbox for 'Divide the backup image into smaller files to simplify archiving'; and a 'File size:' field with a dropdown menu and 'MB' unit. Below these is a 'Description (included in each backup image):' label and a large text box. To the right of the text box is an 'Advanced...' button. At the bottom of the window are three buttons: '<< Back', 'Next >>', and 'Cancel'.

Compression: select "Standard (recommended)".

IMPORTANT: Check box to select "Verify backup image after creation".

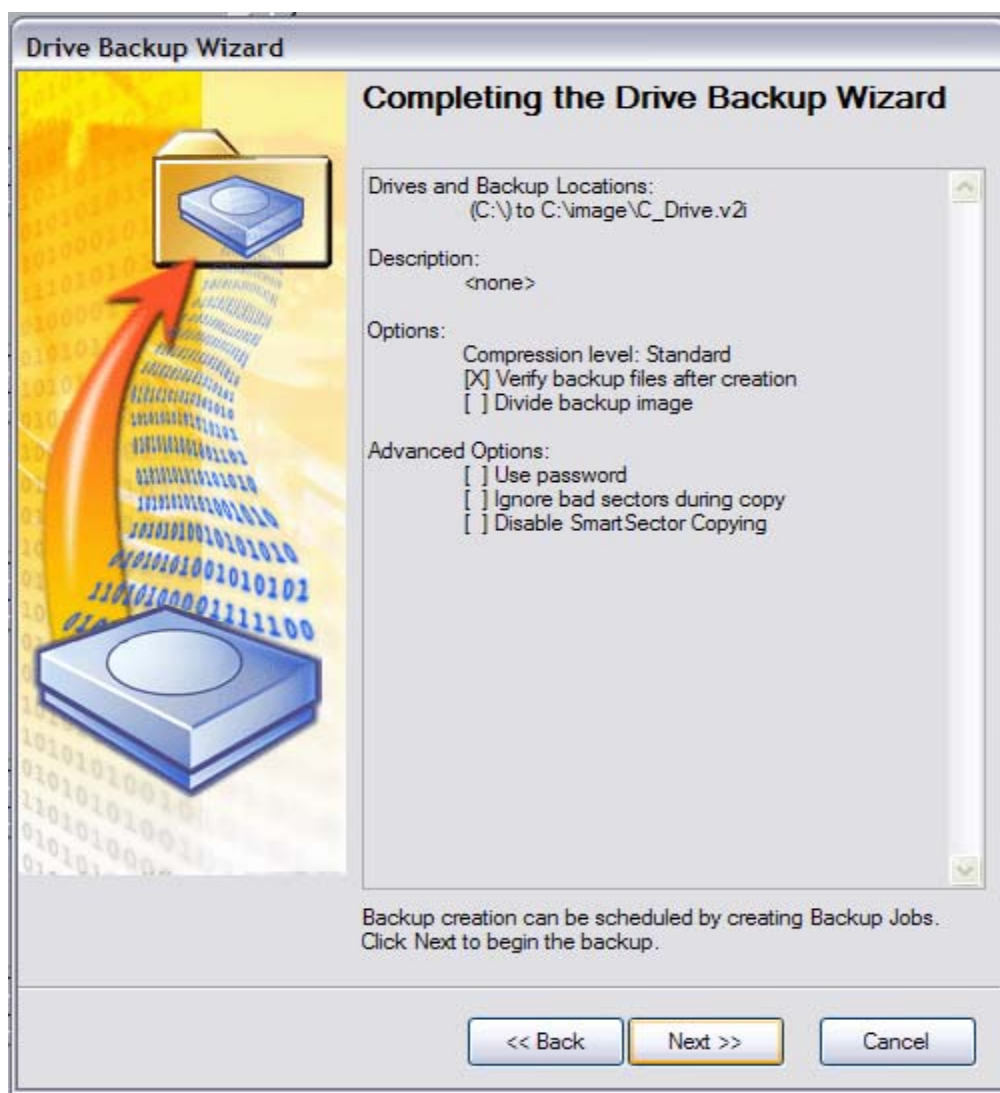
Uncheck box to deselect "Divide the backup image into smaller files...".

Optional: Type a short description of the Backup Image in the text box provided.

Click **Next**.

Note: A compression selection of "None" will reduce the backup/restore time. The default compression selection of "Standard" is usually a good compromise.

1.6. Completing the Drive Backup Wizard



Confirm the Drive Backup Options...

Drives and Backup Locations: (C:\) to C:\image.

Options: Compression Level = Standard
☒ Verify backup files after creation
☐ Divide backup image

Advanced Options: none selected

Click **Next**.

1.7. Creating the Backup Image

In the window that follows, click **Next** to create the backup image.

When the message "Backup of C:\ completed successfully" is displayed, click **Close** to exit the Drive Backup Wizard.

Make sure the backup DVD media are compatible with the EdgeTech Computer's DVD writer.

Insert a blank writeable DVD into the EdgeTech Computer's DVD drive, and wait for it to load.

Note: Some software programs may start automatically when detecting blank DVD media. Always exit these programs, and if prompted, select an option to prevent these programs from starting or taking any automatic action when detecting blank media.

Burn the image files [C_Drive.v2i, Symantic Image file and *.sv2i, Symantic Recovery Disk file] to DVD and remove the DVD storage media containing the backup image for safekeeping.

Note: The entire backup process may take one or more hours to complete, depending on the size of backup image. During backup, the Drive Backup Wizard may require user intervention to insert additional DVD media when images span multiple DVDs or to reinsert multiple DVDs for verification.

2. Restore Procedure

2.1. Preparing to Restore

If the backup image will be restored onto a new/replacement hard drive (Target Drive), install the hard drive into the computer as the Primary IDE Master before proceeding with the restore procedure.

Remove all bootable media such as floppy disks or CD/DVD media (other than the Norton Ghost or PowerQuest Drive Image recovery environment boot disk) from their drives.

2.2. Booting into Recovery Environment

Insert the CD/DVD containing the Recovery Environment into the CD/DVD drive of the computer.

Note: For Norton Ghost this is Symantec Recovery Disk on the Norton Ghost CD, and for PowerQuest Drive Image this is PowerQuest Recovery Environment(PQRE) on the PowerQuest Drive Image CD.

Restart the computer to boot into the recovery environment, and watch the computer screen closely.

If a prompt, "Press any key to boot from CD", appears, press a key within 5 seconds to boot from the CD.

Note: The boot process might take several minutes to complete. During the boot process, the first screen indicates that the Recovery Environment is starting, and shows a progress bar. The next screen shows a "Please Wait..." message above a completed progress bar. Later a blank blue background screen appears, and some time later various combinations of a mouse pointer and hourglass appear on the blue background.

Symantec Recovery Disk

In the End User License Agreement window, click to **Accept** the license agreement.

In the pop-up dialog "Do you want to start Networking Services" click **No** to restore from a local drive.

The boot has completed successfully when the Symantec Recovery Disk main window is displayed.

PowerQuest Recovery Environment

In the top right corner of the Network Configuration dialog window, click the to close this window.

The boot has completed successfully when the PQRE main window is displayed.

2.3. Setting the Time Zone

Setting the correct time zone will ensure that the restored file dates and times are shown correctly.

Symantec Recovery Disk

In the Symantec Recovery Disk main window, click on the Time Zone field to open a "Time Zone" list, then scroll the list and select "(GMT) – Casablanca, Monrovia".

PowerQuest Recovery Environment

In the PQRE main window, scroll the "Time Zone" list and select "(GMT) – Casablanca, Monrovia".

2.4. Starting the System Restore Wizard

Symantec Recovery Disk

In the Symantec Recovery Disk main window, select "Advanced Recovery Tasks".

Then select "System Restore" to start the System Restore Wizard.

PowerQuest Recovery Environment

In the PQRE main window select "System Restore" to start the System Restore Wizard.

2.5. Selecting the Backup Image and Target Drive

Select "Restore drives", then click .

Select "Single drive", then click .

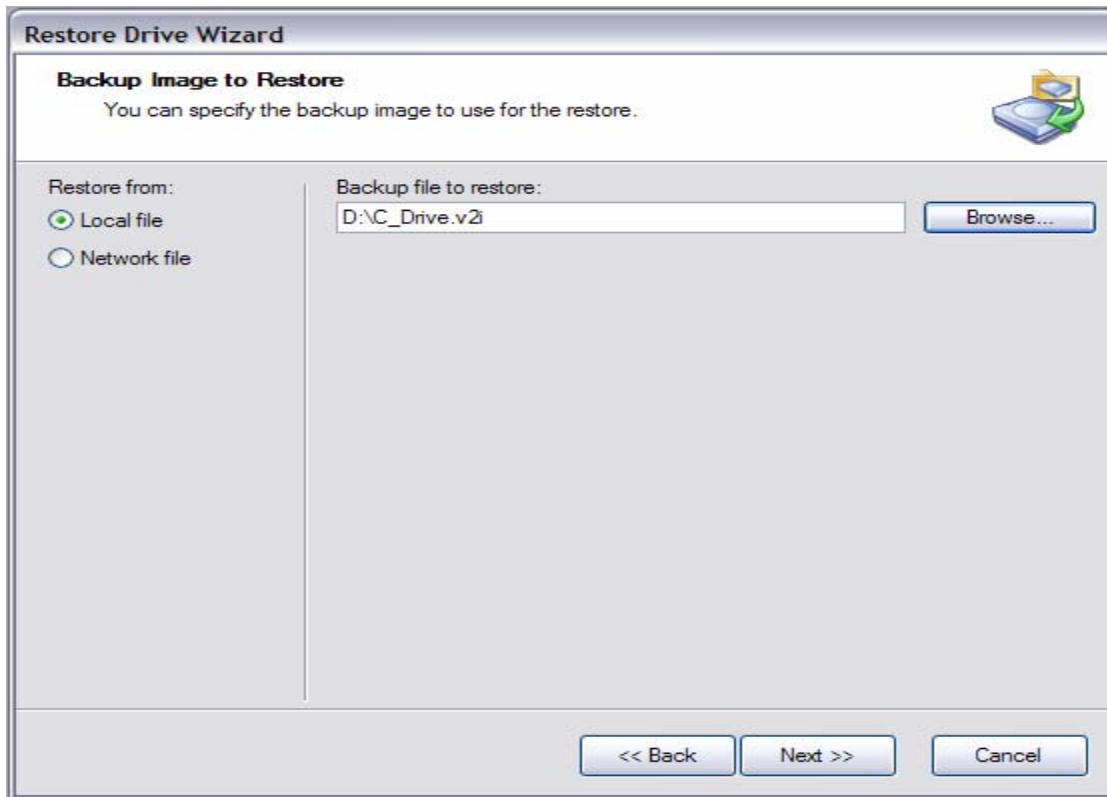
Click while the recovery environment disk is still inside the CD/DVD drive.

When the Open dialog box appears click .

Eject the recovery environment disk and insert Disk 1 of the DVD media containing the backup image. While the DVD media is being read, the mouse cursor will become animated. Wait for about a minute until all mouse animation has fully stopped before proceeding.

Note: In the browse action that follows, if the browse steps are not executed in exactly the correct sequence, PQRE might go back to a previous dialog window and ask for re-insertion of the recovery environment disk. If this happens all the steps following the successful boot must be repeated.

Browse to locate and select the DVD drive (usually the D:\ drive), then from the DVD media select the backup image named "**C_Drive.v2i**" and click **Open**.



When the backup image named "**C_Drive.v2i**" is properly selected, click **Next**.

This next window shows a list of all drives/partitions that are selectable as Target Drives for the EdgeTech computer system backup image.

From this list of drives, find the Target Drive (usually C:\ drive) onto which to restore the backup image.

WARNING

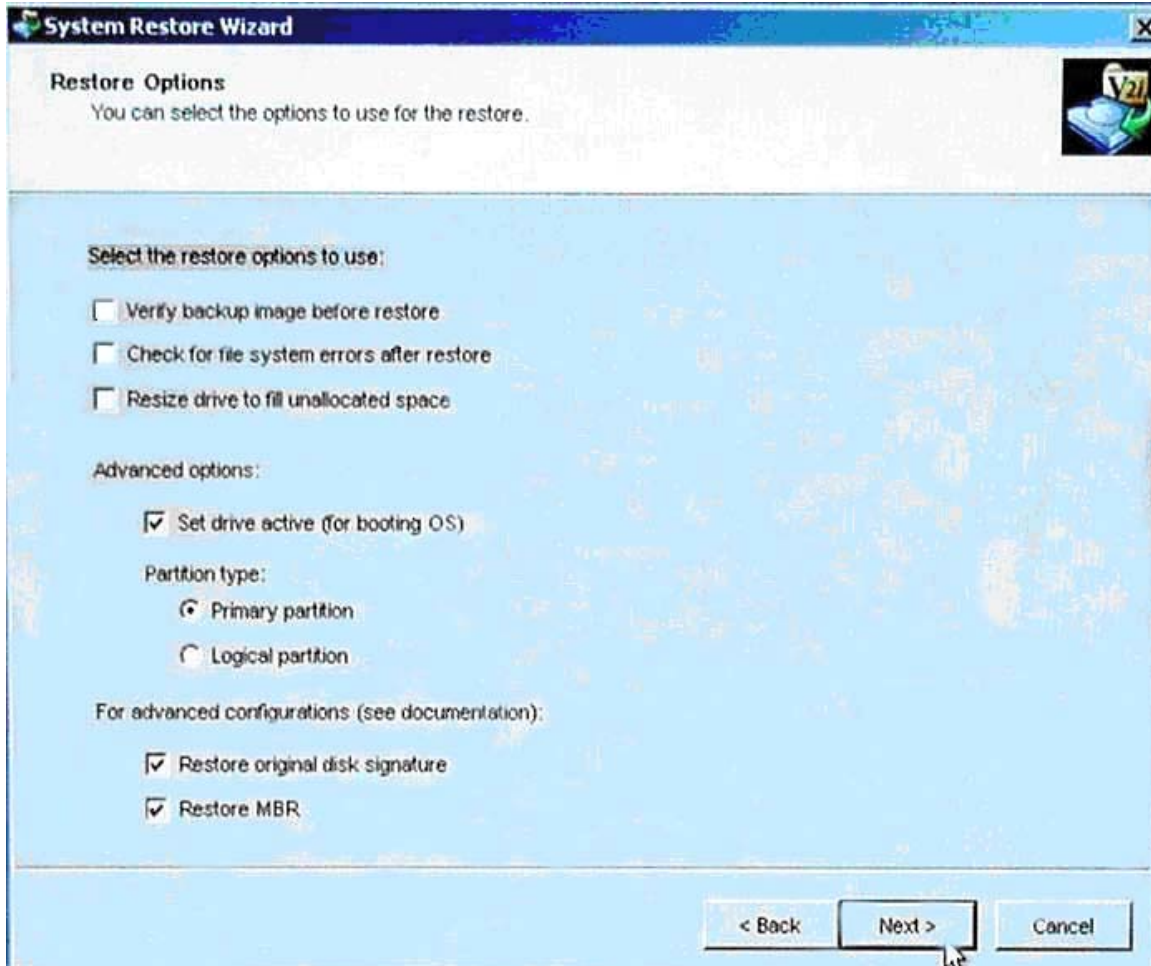
The next step instructs the System Restore Wizard to wipe clean the entire Target Drive before restoring the backup image.

Note that the Target Drive is only virtually deleted at that point, the actual deletion of the drive only takes place during after clicking the final Finish of the System Restore Wizard.

If the Target Drive contains any data files users want to preserve, users are advised to quit this restore process and first attempt to back up those data files.

Data files can be backed up to DVD storage media from Windows XP using either DVD writer software or the Drive Backup wizard of the Norton Ghost or PowerQuest Drive Image software on the computer.

2.6. Selecting the Restore Options



In the Restore Options window, check/clear boxes to select/deselect the options shown in the figure above (also listed in the table below), then click **Next**.

Check	Box / Radio	Menu Option
DESELECT	CLEAR	"Verify backup image before restore"
DESELECT	CLEAR	"Check file system for errors after restore"
DESELECT	CLEAR	"Resize drive to fill unallocated space"
select	check	"Set drive active (for booting OS)"
select "Primary Partition"		Partition Type = "Primary Partition"
select	check	"Restore original disk signature"
select	check	"Restore MBR"

2.7. Completing the System Restore Wizard

Review the Restore options.

Optional: Select "Reboot after Finish".

Click and to restore the backup image.

Note: Restoring the backup image can take one or more hours to complete, depending on its size. If the backup image spans multiple storage media, the user will be prompted to insert media as needed.

When restore is finished, remove restore CD, restart system by pushing reset or powering off then on.

When system restarts,

Click: **Start, Run, Browse**

At the top of the dialog box containing (C:\) to the right

Click: **Compact Disk (E:)**

Double click: **SYSPREP_USER**

Click: **USER.BAT**, ,

To continue follow screen prompts.

System will restart. This may take several minutes.

Under *License Agreement*

Click: ☒ **I accept this agreement**

Click:

Under *Personalize Your Software*

(You must enter a name. If you only want to enter your organization name, place it in the name box.)

Click:

Under *Your Product Key*

Enter your operating system product key (Usually attached to your instrument case.)

Click:

Computer will restart.

In *Logon to Windows*

Replace *Administrator* with: **edgetech**

Do Not Enter a Password.

Click:

Click: **Users and Passwords**

In *Users and Passwords*

Click to highlight: **edgetech**

Uncheck: ☐ **Users must enter a user name and password to use this computer.**

(Window will turn gray.)

Click:

Do Not Enter Password

Click: ,

Setup is complete.

Procedure for Returning Material

All Returned Material

It is necessary to obtain a Returned Material Authorization (RMA) number prior to returning any equipment to EdgeTech. This is to assist EdgeTech in recognizing your equipment when it arrives at our Receiving dock, and to assist us in tracking your equipment while it is at our facility. The material should be shipped to the address indicated on the cover sheet of this manual.

Outside Continental United States

In addition to obtaining an RMA number, the following additional steps apply to that material being returned from outside the Continental United States. These steps should be followed carefully to prevent delays and additional costs.

1. All shipments must be accompanied by two copies of your commercial invoice, showing the value of the material and the reason for its return. Whenever possible, please send copies of original export shipping documents with the consignment.
2. If the value of the equipment is over \$1,000 (US), the following shipper's oath must be sent along with the invoice. This oath can be typed on the invoice, or on a separate letterhead.

"I _____ declare that the articles herein specified are products manufactured in the United States; that they were exported from the United States from the port of _____, on or about _____; that they are returned without having been advanced in value or improved in condition by any process of manufacture or any other means; and that no drawback, bounty, or allowance has been paid or admitted hereof.

Signed _____.

3. If there is more than one part per consignment, a packing list must accompany the shipment. It is acceptable to combine the commercial invoice and packing list as long as the contents of each carton are clearly numbered and identified on the commercial invoice.
4. Consign all air freight shipments to EdgeTech in care of Intercontinental Transport Services, Inc., Logan International Airport, East Boston, MA 02128.
5. If the equipment is the property of EdgeTech, please insure for full value.
6. Route via Logan International Airport only as the final destination.
7. Mail one invoice, packing list, and copy of airway bill to EdgeTech upon shipment.
8. Please refer to the issued RMA number on all documents and correspondence.
9. Air freight must be paid on all returns.

